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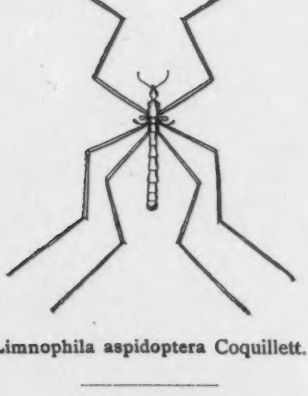

Limnophila aspidoptera Coquillett.

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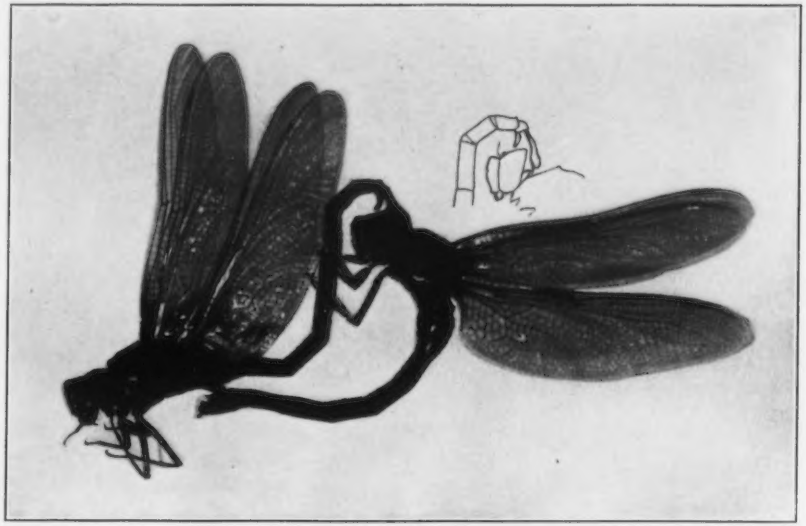

AESHNA CONSTRICTA SAY.

MALE TO LEFT. FEMALE TO RIGHT.

(SEE CALVERT, P. 148.)

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XVII. MAY, 1906. NO. 5.

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Copulation of Odonata.

I.—BY E. B. WILLIAMSON.

In ENT. NEWS, February, 1899, page 42, I questioned, for the first time, the accepted statement that in pairing the male dragonfly grasps the female by the prothorax. No observations by others, so far as I know, have confirmed or corrected this observation which pointed out that, in some of the Anisoptera at least, the female was grasped by the head. Observations made during the season of 1905 permit the recording of some details in the method of "coupling" in the suborder Zygoptera. The procedure, for the sake of clearness, may be classified and subclassified as follows:

A.—The two jaws of the pincers by which the male grasps the female, formed by (1), the superior appendages, and (2), the inferior appendage. In couple the inferior appendage rests on top of the head, and the superior appendages on the rear of the head of the female. SUBORDER ANISOPTERA. Positive observations in the case of *Celithemis*, *Sympetrum*, (Libellulinae), *Gomphus* (Gomphinae), and *Aeshna* (Aeshninæ).

AA.—The two jaws of the pincers by which the male grasps the female, formed by the two superior appendages, acting forceps-like, or by the inferior appendages, acting in a similar manner. In the case of certain species, judging from the form of the appendages, superior appendages and inferior appendages each act as a pair of forceps, so the female is doubly secured. Also it must be noted that the two superiors acting together may form one jaw of a pair of pincers, the other jaw of which is formed by the two inferiors. In couple the superior appendages of the male rest behind, and the inferior appendages in front, of the hind margin of the pronotum of the female. SUBORDER ZYGOPTERA.

B.—Superior appendages of the male forming two jaws, in couple grasping the most anterior portion of the mesepisternum and the mesostigmal laminae of the female.

C.—Inferior appendages of the male in couple extended over the dorsum of the pronotum of the female, scarcely or not touching it, and with their apices resting against the rear of the head. When the abdomen of the male was disturbed the inferior appendages in some cases did not touch the head of the female, in other cases the tips of these appendages were extended to the top of the female's head. Undisturbed they rested against the rear of the occiput, performing no work of grasping whatever. All female Zygoptera observed when in couple keep the prothorax drawn tightly against the mesothorax. *Lestes.* Positive observations in the case of *L. forcipatus* and *L. unguiculatus.*

CC.—Inferior appendages of the male resting on the anterior side of the hind lobe of the prothorax of the female. *Hetærina.*

BB.—Inferior appendages forming two jaws which grasp the anterior surface of the hind lobe of the pronotum of the female, the superior appendages resting in cups formed by depressions in the mesostigmal laminæ and the rear surface of the hind lobe of the pronotum and, depending on their form, grasping the mesostigmal laminæ or not. The female by drawing the hind lobe of the pronotum closely against the mesostigmal laminæ prevents the escape of the male.

D.—Dorsum of apex of segment 10 of male modified to form a brace against the middorsal carina or its fork or the cavity in the fork. *Anomalagrion, Ischnura, Enallagma.*

DD.—Dorsum of apex of segment 10 of male with a viscid pruinose tubercle on either side which attaches itself to the mesepisternum of the female on either side of the fork of the middorsal carina, the tubercle which corresponds to the inferior appendage of Anisoptera engaging the cavity in the fork between the mesostigmal laminæ. *Argia* (*putrida* and *apicalis*).

In Proc. U. S. Nat. Mus. Vol. XXVIII, p. 175, I have discussed pruinescence as a sex mark and signal. The pruinescence of the apical abdominal tubercles of male Argias serves another purpose, i. e., that of making more secure the coupling of the sexes. Females separated from the males usually have a whitish spot on the mesepisternum where the tubercles of the male have rested. The above description in coupling in group BB shows at once the reason of the inability of the male to release the female at will. How secure this coupling is may be known from the fact that I once captured a female *Enallagma exsulans* to whose thorax was attached the last nine abdominal segments of the male. Possibly a bird or fish had snapped away the remainder of the body of the male.

The above notes are tentative in so far as I have positively examined coupling in a limited number of species. To what extent the superior appendages of the male grasp the mesostigmal laminæ of the female in Agrioninæ is difficult of determination. In local species I believe it is very slight, though the appendages, of course, rest securely against the laminæ, so held by the pronotum. In many species of *Enallagma* and *Ischnura* the presence of hooks or teeth on the inferior surface of the superior appendages indicates that these appendages engage closely the rear surface of the hind lobe of the pronotum where they would be held securely by the opposite pressure of the inferior appendages on the anterior surface of the hind lobe of the pronotum.

"Though the subject of Odonate copulation has been considered by many authors with 'presque toujours une description détailée et souvent poétique,' I have been unable to find any statement concerning the filling of the seminal vesicle of the male dragonfly, other than that this takes place before copulation. In the case of *Calopteryx*, *Argia* and *Enallagma*, where I have been able to make positive observations, the male fills the seminal vesicle at once after he has captured the female. It seems probable that during the wild flight of mating Aeshnas and some of the Gomphines (I have noticed especially *Dromogomphus spoliatus*) the seminal vesicle is being filled, and, this

accomplished, the pair come to rest in tree-top, on the ground, or where not, and copulation takes place."—Williamson, Proc. Ind. Acad. Sci., 1901, p. 125.

In the final act of copulation still other harmonious relationships of parts are necessary. The abdomen of the female must be curved forward and upward and its apex brought into proper position to the accessory genitalia of the second abdominal segment of the male. Often this is accomplished only after repeated trials, and sometimes there is failure to copulate. Any deformity in the grasping apparatus of the male which would tend to hold the female out of proper position, though admitting of securely retaining her, or any malformation of the female's thorax or head, having the same effect, might prevent copulation. Abdominal length or brevity of abdomen of either sex might also prevent it. Crooked abdomens or the absence of free articulation of abdominal segments might have a prohibitive effect. And, if the apex of the female abdomen is brought into position with the accessory genitalia of the male, it yet remains, before copulation can take place, that these parts should be mutually adapted to each other. So, to sum up, the Odonata, in the securing of the female, the filling of the seminal vesicle and the final act present an example of copulation possibly unique in the complexity of its accomplishment. This complexity explains at once the isolation which certain species enjoy though associated with numerous congeners of similar habits. That such species with their complex sexual adaptations appeared by mutation is almost inconceivable. Geographical isolation and gradual modification offer a more plausible explanation.

Various factors contribute to the preservation of related species when brought in contact with each other in a restricted area. The factor above discussed, *i. e.*, complexity of the sexual act, is almost inoperative probably in the genus *Libellula* for example. Here there is considerable uniformity in size and great uniformity in the structure of all parts concerned in copulation. But the males fight for the females in the open, over the water or above the reeds; and it is possible

for a novice in entomology to readily identify our Libellulas with a key based on wing markings. Again in many of the Calopteryginæ there is great uniformity in the parts concerned in copulation but great diversity of wing markings. The genera *Rhinocypha* and *Calopteryx* may serve as examples, and in both it has been shown that the sexes are attracted to each other by movements and displays of color. On the other hand, the species of *Sympetrum*, which are, with a few exceptions, very uniformly colored and without wing markings, have some diversity in the form of the abdominal appendages of the male and great diversity in the accessory genitalia of the male and the vulvar lamina of the female. These differences reach a maximum of development in the swift-flying Somatochloras which are, with one or two exception, without wing markings and with bodies uniformly colored, but which show a remarkable diversity in the abdominal appendages of the male and the vulvar lamina of the female. In the Agrionines and *Lestes*, species generally with colorless wings and weak flight, there is great diversity in the structure of the male appendages and the female thorax. Upon these parts to a great extent all authors have based the most satisfactory definitions of species. That there is a fundamental difference in the factors which contribute to or determine the preservation of species, and that among certain species this factor is the complexity of the sexual act, and among others it is the possession of obvious external characters, determined possibly by sexual selection, is suggested by a comparison of Dr. Calvert's treatment of the genus *Argia* (Agrioninæ) in the *Biologia Centrali-Americana*, and De Sely's treatment of *Rhinocypha* (Calopteryginæ) in the *Synopsis des Calopterygines* and its *Additions*. In the Agrionine genus *Enallagma* there is considerable uniformity in the size of species. The species of the genus *Lestes* vary more in this particular. It is in the Agrionines possibly that the most diverse forms of abdominal appendages are found, though the Gomphines (almost uniformly colorless-winged species) have these parts developed in extremely different manners. The Aeschnines, most of which have colorless wings, have considerable diver-

sity in these parts, and many species have the body colors very brilliantly and diversely developed.

In the genus *Gomphus* as it occurs about my home at Bluffton, Indiana, it may be noted that all species are colorless-winged; certain ones are of about the same size; these certain ones occur at the same season, at the same place, have apparently identical habits and are very similar in body markings. Under these conditions the complexity of the copulatory act is probably the only barrier to the free intermingling of these species. I have already in the ENT. NEWS described a hybrid of *graslinellus* and *sordidus;* and during the season of 1905 a number of specimens were taken which, in the opinion of Dr. Calvert and myself, are specifically indeterminable, combining characters of both *crassus* and *fraternus*, two closely related species in which the abdominal appendages of the males are very similar. Both species were flying at the ripple where the indeterminable specimens were taken. Dr. Kellicott once remarked that he could not understand how, among the Enallagmas at Cedar Point, Ohio, the males could recognize their own species of the opposite sex, and he studied many specimens carefully but without discovering any evidence of hybridization so far as I know. The coupling of different species has been reported a number of times but I know of no record of copulation. However, near Bluffton, *Enallagma civile* and *carunculatum*, two species with very similar appendages are brought in contact in numbers about a 6-acre pond. I have studied probably 500 males from this pond, and have found a few specimens (20-30 possibly) which were clearly intermediate.

II. By PHILIP P. CALVERT.

(With Plate VII)

Mr. Williamson has asked me to add any notes or suggestions which occur to me on the subject of his paper.

I can confirm his observations in the cases of *Aeshna constricta* and *Sympetrum vicinum*. The former is illustrated by Plate VII, based on a photograph from specimens in my collection labeled, "Taken in this position (of copulation) Oct. 1,

1893. Ridley Twp., Del. Co., Pa. P. P. Calvert, collector." I cannot find any notes made on this pair, but their history, as far as I can recall it from memory, is as follows: In the afternoon of the day mentioned, I saw a pair flying together in the position represented by Plate VII and alighting on the branch of a tree close to the ground. Approaching cautiously, I was able to seize one with my right hand, the other with my left at the same instant, without pulling them apart, or without the insects themselves separating. The capture occurred near the house and some one of the family poured a few drops of benzine on the insects, while I held them in position, until this substance killed them. Each was pinned to the same piece of cork which serves as a common mounting block, while a stouter pin thrust through the cork enables the pair to be moved about as one specimen. Some years later, Dermestids got access to them and made large cavities in the eyes of both, but, fortunately, did not injure the specimens seriously otherwise, before the depredations were discovered. Dr. Skinner then kindly made a photograph of the pair lest other injury be done, and the prints have been in my possession for some years. Excepting the damage referred to, the specimens themselves are in good condition. In only one detail does the copulatory position seem to have been lost: the appendages of the male are no longer in actual contact with the head (due probably to some contraction of the abdominal muscles and to shrinkage from drying of the tissues), although they retain the angular divergence which corresponds with Mr. Williamson's description. The shadows, which appear around the head of the female in the photograph, obscure the details to such an extent that I have shown these in outline on the plate, on the same scale, by a drawing made directly from the insects.

Perhaps a photograph made of living Odonata while pairing may reveal some differences from what is here shown on Plate VII, and some entomologist may be fortunate enough to secure such a view. That it is often not difficult to approach these insects at this time, and at short range, is shown also by the fact that on August 29, 1895, at Interlaken, Switzerland, I caught a

similar pair of *Aeshna cyanea* in my fingers, although I was not able to preserve their positions.

Finally, I can confirm Mr. Williamson's observations in the case of *Sympetrum vicinum*, at Philadelphia, November 6, 1900, and at Lake Hopatcong, New Jersey, September, 1902. In September, 1905, at Loch Bonnie, near Lake Placid, in the Adirondacks, New York, I attempted to make exact observations on the method of holding the female in *Lestes forcipatus* Ramb., but all that I could determine was that the terminal appendages of the male grasped the female's prothorax, the superior appendages on its posterior, the inferior appendages on its anterior, surface.

A New Ichneumonid.

BY HENRY SKINNER.

Metopius harbecki n. sp.—The following markings are yellow: Margin of facial shield, apical half of scutellum, a dot on postscutellum, the first abdominal segment, a small triangular patch on apex of the third dorsal abdominal segment, the apical margin of the fourth dorsal, third coxæ at apex and outer half of sides, third trochanters and small spot at apex of third femora.

The nearest ally to this distinct species is *pollinctorius* Say. Described from one specimen taken by Mr. H. S. Harbeck at Germantown, Philadelphia, on September 25, 1904. The type is in the collection of the American Entomological Society.

DR. SAMUEL G. DIXON, President of the Academy of Natural Sciences and Health Commissioner of Pennsylvania, has directed Mr. Henry L. Viereck to make a mosquito survey of the State.

LAST SUMMER, while collecting in a swamp, a skipper, *Pamphila metacomet*, alighted on my hand, turned its abdomen upward and the tip forward and discharged a small drop of colorless fluid on my hand. This it eagerly sucked up through its proboscis, repeating the operation not less than half a dozen times. I then placed the cyanide bottle over it. As soon as its struggles had ceased, I took it from the bottle, pressed the abdomen, and obtained a drop of the fluid. It was tasteless, possibly slightly sweet. This may be a common habit, but I have never happened to observe it before.—E. B. WILLIAMSON, Bluffton, Indiana.

Parasitic Hymenoptera of Algonquin, Illinois.—IV.*

By Wm. A. Nason, M. D.

(Continued from page 172, Vol. xvi, No. 6)

CHALCIDIDÆ.

Leucospis affinis Say.
June 13, 21. Aug. 12, 1895.
June 4, 1896.
10 specimens, ♂ ♀.

Smicra torvina Cress.
Oct. 8, 1893.
Aug. 31, 1894.
May 29. July 25, 1895.
6 specimens, ♀.

Smicra delumbis Cress.
Sept. 21, 1894.
July 3, 1895.
2 specimens, ♂ ♀.

Smicra rufofemorata Cress.
1 specimen, ♂.

Smicra flavopicta Cress.
Sept. 21, 1894.
1 specimen, ♀.

Phaegonophora sulcata Westw.
2 specimens, ♀.

Chalcis ovata Say.
July 16, Aug. 1, 1895.
6 specimens, ♂ ♀.

Chalcis flavipes Fabr.
3 specimens, ♀.

Haltichella xauticles Walker.
Sept. 6, 1895.
1 specimen, ♀.

Perilampus cyaneus Brullé.
July, 8, 1894.
July 3, 24, 25, Sept. 17, Oct. 5, 1895.
10 specimens, ♀.

Perilampus platygaster Say.
Aug. 21, 30, 1894.
July 25, 1895.
3 specimens, ♀.

Perilampus fulvicornis Ashm.
Sept. 4, 1894.
1 specimen, ♀.

Perilampus hyalinus Say.
Sept. 21, 1894.
June 13, 14, July 29, Aug. 16, Sept. 17, 1895.
8 specimens, ♂ ♀.

Lamprostylus nasonii Ashm.
June 4, 1895.
2 specimens, ♀.
Co-types, types in Ashm. coll.

Eurytoma auriceps Walsh.
Sept. 27, Oct. 16, 18, 22, 27, 1895.
5 specimens, ♂, ♀.

Eurytoma bicolor Walsh.
Sept. 15, 1895.
1 specimen, ♀.

Eurytoma diastrophi Walsh.
Sept. 10, 15, Oct. 3, 1895.
4 specimens, ♂, ♀.

Eurytoma prunicola Walsh.
Sept. 21, 1894.
June 11, 1895.
2 specimens, ♂, ♀.

Eurytoma tylodermatus Ashm.
Aug. 23, 1894.
1 specimen, ♀.

Bruchophagus funebris Howard.
Aug. 24, 1895.
1 specimen, ♀.

Decatoma nubilistigma Walsh.
July 19, 23, 1895.
2 specimens, ♀.

Isosoma hordei Harris.
July 3, 1895.
1 specimen, ♀.

*Determinations were made by Dr. Wm. H. Ashmead, of Washington, D. C.

Monodontomerus montivagus Ash.
June 9, 10, 1894.
7 specimens, ♀.
Syntomaspis brodei Ash.
Sept. 8, 1894.
1 specimen.
Syntomaspis elegans Prov.
1 specimen, ♂.
Torymus omnivorus Ashm.
May 4, 1895.
1 specimen, ♂.
Torymus diamonoides Ashm.
June 7, 13, 1895.
2 specimens, ♀.
Co-types, types in Ashm. coll.
Ormyrus querci Fitch.
Oct. 2, 1905.
2 specimens, ♂, ♀.
Ormyrus ventricosus Ashm.
May 4, July 3, 1895.
2 specimens, ♂.
Eupelmus allynii French.
July 18, 26, 27, Oct. 27, 1895.
4 specimens.
Bothriothorax peculiaris Howard.
Aug. 8, 1895.
1 specimen, ♀.
Spalangia aenea Say.
April 25, May 7, 1895.
2 specimens, ♀.
Spalangia rugosicollis Ashm.
July 9, 1894.
1 specimen, ♀.
Spalangia drosophilæ Ashm.
Aug. 26, 1894.
1 specimen, ♀.
Halticoptera trypetæ Ashm.
May 9, 1894.
April 30, May 3, 1895.
3 specimens, ♂, ♀.
Co-types, types in Ashm. coll.
Trigonoderus maculatus Ashm.
Sept. 19, 1895.
2 specimens, ♀.
Co-types, types in Ashm. coll.

Caratomus megacephalus Dalm
June 29, 1894.
June 2, 8, 1895.
May 12 to June 29, 1896.
29 specimens, ♂, ♀.
Merismus texanus Ashm.
Sept. 17, 1895.
1 specimen, ♀.
Syntomopus affinis Ashm.
Sept. 15, 1895.
1 specimen, ♀.
Syntomopus americanus Ashm.
June 17, 27, 1895.
2 specimens, ♀.
Pachyneuron allograptae Ashm.
Sept. 22, 1895.
1 specimen, ♀.
Pachyneuron micans Howard.
Aug. 22, 1894.
1 specimen, ♀.
Pachyneuron siphonophoræ Ash.
1 specimen, ♀.
Merisus destructor Say.
July 28, 1894.
1 specimen, ♂.
Bœotomus rufiviventris Ashm.
Oct. 2, 1895.
1 specimen, ♀.
Habrocytus thyridopherygis Ashm.
May 22, Sept. 22, 27, Oct. 3, 1895.
6 specimens, ♀.
Hypopteromalus tabacum Fitch.
July 10, Sept. 27. 1895.
2 specimens, ♀.
Epipteromalus algonquinus Ashm.
June 27, July 3, 6, Sept. 27, 1895.
4 specimens, ♀.
Co-types, types in Ashmead coll.
Pteromalus commæ Ashm.
July 3, 1895.
1 specimen, ♀.
Pteromalus graptæ Ashm.
May 15, 25, July 4, Aug. 18, Oct. '17, 1894.

May 10, Sept. 1 to 22, Oct. 2 to 29, 1895.
67 specimens, ♂, ♀.

Pteromalus incongruus Ashm.
Oct. 3. 27, 1895.
2 specimens, ♀.
Co-types, types in Ashm. coll.

Pteromalus puparum Linn.
May 7, 9, 16, 1895.
14 specimens, ♀.

Pteromalus vanessæ Harris
Sept. 4, 1894.
July 3 to 25, Sept. 22, 27, 1895.
7 specimens, ♀.

Meroporus calandræ Howard.
June 9, 30, July 3 to 15, Aug. 23, 1894.
Sept. 5, 17, 1895.
11 specimens, ♂, ♀.

Neocatolaccus tylodermæ Ashm.
Aug. 20, 1894.
June 19, 28, Aug. 16, 1895.
5 specimens, ♀.

Catolaccus nigroaepeus Ashm.
July 10, 1895.
1 speeimen, ♀.

Catolaccus incertus Ashm.
Oct. 27, 1895.
1 specimen, ♀.

Catolaccus anthomyiæ Ashm.
June 7, Oct. 16, 1895.
2 specimens, ♀.

Arthrolytus clisiocampæ Fitch.
June 4, Aug. 7, 1894, Sept. 27, Oct. 2, 1895.
4 specimens, ♀.

Cælopisthus suborbicularis Prov.
April 21, July 3, Sept. 17, 19, 1895.
4 specimens, ♀.

Euplectrus catocalæ Howard
June 20, 1895.
1 specimen, ♀.

Miotropis clisiocampæ Ashm.
Aug. 2, 31, 1894.
2 specimens, ♀.

Cirrospilus flavicinctus Riley.
June 2, Sept. 22, 27, Oct. 2, 1895.
4 specimens, ♀.

Cirrospilus flavimaculatus Ashm.
Sept. 27, 1895.
2 specimens, ♀.

Melittobia pelopaei Ashm.
May 28, June 2, July 18, Aug. 15, Sept. 15, 17, 1895.
7 specimens, ♁.

Sympiesis tischeriæ Vrch.
Sept. 27, Oct. 16, 1895.
2 specimens, ♀.

Sympiesis dolichogaster Ashm.
Sept. 20, 27, 1895.
3 specimens, ♀.

Sympiesis quercidæ Ashm.
Oct. 16, 1895.
1 specimen, ♀.

Sympiesis chenopodii Ashm.
Oct. 2, 1895.
1 specimen, ♀.

Uriella rufipes Ash.
June 26, July 3 to 28, Aug. 11, 22, 1894.
May 4, 9, 48, June 15, July 8, Aug. 34, Sept. 17, 1895.
Co-types, types in Ashmead coll.

Metapachia acutiventris Ashm.
May 22, Sept. 19, 1895.
2 specimens, ♀.
Co-types, type in Ashmead coll.

Nasonia brevicornis Ashm.
May 11, June 12, July 3, 1895.
3 specimens, ♀.
Co-types, type in Ashmead coll.

Eutodon lithocolletidis Ashm.
Aug. 1, 1895.
1 specimen, ♂.

Asecodes quercicola Ashm.
July 10, 1895.
1 specimen, ♂.

Omphale livida Ashm.
Sept. 15, 1895.
1 specimen, ♀.

Chrysocharis albitarsis Ashm.
Aug. 1, Oct. 2, 6, 1895.
4 specimens, ♂, ♀.
Solenotus bimaculatus Ashm.
Sept. 27, 1895.
1 specimen, ♀.
Co-types, types in Ashmead coll.
Solenotus pulchripes Ashm.
Sept. 27, Oct. 2, 3, 1895.
Co-types, type in Ashmead coll.
Tetrastichus racemariæ Ashm.
July 7, 1894.
1 specimen, ♀.
Tetrastichus sp.?
Sept. 27, Oct. 27, 1895.
4 specimens, ♂.
Tetrastichus sp.?
Oct. 2, 1895.
2 specimens, ♀.
Closterocerus niger Ashm.
June 25, 1894.
1 specimen, ♂.
Co-type, type in Ashmead coll.
Rileya cecidomyiæ Ashm.
Aug. 16, 1865.
1 specimen, ♀.

EVANIIDÆ.

Hyptia reticulata Say.
Gasteruption incertus Cress.

Notes of a Winter Trip in Texas, with an Annotated List of the Orthoptera.

By Charles A. Hart, Urbana, Ill.

In late December and early January I had the pleasure of briefly studying the insect-life of four unlike Texan localities. For valued assistance in this undertaking, I wish to express my thanks to my relative, Prof. E. C. Green, and to Prof. A. F. Conradi, both of the Texas Agricultural and Mechanical College; to the Houston and Texas Central Railroad; and to Mr. A. P. Atwater, of Houston.

The first six days, December 22-27, were spent in the vicinity of the College, in Brazos County, 150 miles inland from the Gulf. The soil is clayey or sandy upland, partly covered with a scrubby forest, mostly post oak, and intersected by shallow grassy ravines. On December 28th and 29th I was in the broad bottom lands of the Brazos River, in the same county, areas of heavy forest, alternating with large fields of cotton, alfalfa, etc. January 3d and 4th saw me at work along the low open grassy outer shore of Galveston Island, near the west end of the great sea wall; and the 5th and 6th, in the coastal plain at Houston, fifty miles inland, west of the section called Houston Heights, in the vicinity of

the head of a small steep-sided ravine, running to the Buffalo bayou near by, the surroundings being a sparse forest, mostly loblolly pine.

The conditions were essentially those of late October in Illinois. The grass and weeds were dead, as a rule, and the deciduous trees leafless. A few frosts had previously occurred. The weather on the above days was sunny and warm at midday, giving a brief collecting period from about 11 A. M. to 3 P. M., when a few insects were seen moving about in the sunshine.

Of the Hymenoptera, two or three parasitic species were noted, and a few *Polistes pallipes* at Houston. The common stinging ants about College Station, *Pogonomyrmex comanche*, were seen about their low mounded nests. Occasional Muscidæ and three or four butterflies were observed. A single species of dragonfly (*Sympetrum*) and a prettily banded *Panorpa* were taken several times. Two tiger-beetles and a few *Eleodes* were found sunning themselves. Among Hemiptera there were taken a few pentatomids and a large coreid (*Acanthocephala declivis*). The only plant-feeder which appeared to be definitely at work was a small *Clastoptera*-like species swept from the fresh green pine leaves. A bovine skull lying on the ground at the Houston locality revealed the openings of several large round burrows beneath it. Upturning the loose soil with a stick, a number of *Geotrupes* were thrown out. *Dermestes* and *Silpha* were noted on animal remains at Galveston.

Insects under bark, logs, etc., seemed not especially numerous. They were mostly of the usual familiar types, though often of unfamiliar species. At Galveston nearly all wood fragments had been swept away, except a line of driftwood near the inner edge of the beach, which was destitute of insect life, and only stone and metal debris remained. These gave some interesting Nabidæ and Tenebrionidæ, however, and an old pair of pants by a pasture fence proved quite a treasure-house. *Lacon rectangulus* and *Opatrinus aciculatus* were common, both here and at College Station. The remaining principal hibernating forms seen were Carabidæ, *Termes*,

Disonycha, Reduviidæ, Aradidæ, ants, and sluggish, immature scorpions.

The Orthoptera received especial attention. The previous frosts had apparently killed all grasshoppers in level, open lands and other exposed situations, but they were still fairly common where protected by trees, weeds, brush, or sloping banks, as in the grassy hollows about College Station. At Galveston they were somewhat more generally distributed. Out of about 1,200 insects collected, over 800 were Orthoptera. The largest collection of Orthoptera in any one day came from the Houston locality, where 108 were taken on January 6th. No Phasmidæ or Mantidæ were observed in any stage, and the Locustidæ were represented only by a few *Conocephalus*, some of these being under shelter, as if hibernating. Some of the 'hoppers were getting pretty ragged, but in general they were in fair condition. The following is an annotated list of the species, including some other Texas records. These are mostly from specimens received from Mr. Conradi, now in the collection of the Illinois State Laboratory of Natural History, in which all the above material has been placed. The four localities are cited by their initials, using "B." for the Brazos River bottoms. The dates have already been given for each place, and need not be stated in detail.

LIST OF THE ORTHOPTERA.

Anisolabis maritima Bon. B., 19 adults and nymphs. Under logs about farm buildings, near the high river-bank. New to Texas, and unusual so far inland.

Labia burgessi Scudd. H., 9 adults, 8 nymphs. Found under the loose bark of a large fallen pine, in company with the next species, from which it scarcely differs, except in the obtected and apparently functionless wings, and the smaller tegmina. A Florida species, new to Texas.

Labia guttata Scudd. H., 3 adults, 9 nymphs. Found with the preceding, as stated.

Ischnoptera? spp. C., B., G., 7 nymphs. Under boards, etc.

Kakerlac americana Scudd (*Loboptera*). "Tex." (Bolter Coll.) New to Texas.

Periplaneta americana Linn. G., 4 examples; C. (Coll. I. S. L. N. H.) This is the dominant roach in Houston and Galveston.

Oligonyx scudderi Sauss. C. (Coll. I. L. N. H.)

Paratettix texanus Hanc. C. (Coll. I. S. L. N. H.); H., 3, more seen. Near the small stream.

P. texanus nanus Hanc. H., 2. This is quite possibly a distinct species.

Tettigidea lateralis Say. C. (Coll. I. S. L. N. H.); H., 1.

Syrbula admirabilis Uhl., October 28th (Coll. I. S. L. N. H.). H., 1. Much larger than Illinois examples.

Mesochlora abortiva Brun. C., 14 ♂, 28 ♀, 1 young; B., 4 ♀. One of the commonest species about College Station, on the dry, thinly grassed sides of stream hollows.

Mesochlora unicolor n. sp. C., 8 ♂, 11 ♀; B., 1 ♂. Associated with the preceding, and not differing appreciably from it except in the dorsal sculpture and coloration; the two not intergrading, however, in the series obtained.

Readily recognized by the uniform gray of the tegmina and dorsal surfaces of head and pronotum, the lateral carinæ uniform throughout, not partly swollen, at middle less sharply curved than in *abortiva*, and usually separated here by more than half the distance between them at the posterior margin. The pronotal lateral black spot and oblique carina are about as in *abortiva*.

In *abortiva*, on the other hand, there is a velvety black line on the tegmina, sometimes broken, and two straight stripes of this color on the head and pronotum above. On the pronotum these include the strongly clepsydral lateral carinæ, the convergent portions of which are straight, swollen, and ivory-white, connected by a fine short arc, the carinæ here separated by about half the distance between them on the posterior margin. Type in collection of Ill. State Lab. of Nat. Hist.

Amblytropidia occidentalis Sauss. C., 1; H., 23. Abundant among the pines, very elusive, flying short distances noiselessly and almost invisibly, the dorsal color closely matching that of the fallen pine needles.

Orphulella pelidna Burm. C., 24, 1 nymph; B., 1; H., 36; G., 6. Widely distributed and common in short grass. Galveston examples are mostly a little shorter winged and greener, suggesting the next.

O. picturata Scudd. C., 12; B., 6. With the preceding.

Dichromorpha viridis Scudd. H., 2. Green variety.

Arphia xanthoptera Germ. C., 1; H., 4.

A. simplex Scudd. H., 8 ex. With the preceding on dry sunny open spots in woods.

Chortophaga viridifasciata DeG. C., 12; B., H., 5; G., 10. Many others seen. The green form is rarer than in Illinois. Both sexes were seen to produce the crackling sound in flight. I was struck by the abundance and activity of both young and adults. They seemed thoroughly at home at this season.

Encoptolophus costalis Scudd. C., 3; B., 4; H., 1. On bare dry exposures of washed-out roads or stream banks.

Hippiscus rugosus Scudd. C., 1.

Dissosteira carolina Linn. B., 1.

Trachyrhachys fuscifrons Stal. (*Mestobregma*) C., 1. On low gravelly mound in stream bed.

Conoza amplicornis Caud. (*Psinidia sulcifrons amplicornis* Caud.) G., 1 ♂, 1 ♀. Among little sandy hillocks, in company with *Heliastus*. Described from a male and female from Victoria, Tex. Apparently a good species. Posterior edge of pronotum dorsally strongly concave each side, with a marked acute process at middle. Wings of female orange tinted. Pronotal carina deeply cut twice. The male is remarkably small; body 12.5 mm., tegmina 13 mm. antennæ 9 mm. Other characters just as described by Caudell.

Trimerotropis citrina Scudd. B., 5; G., 10. Common on the high banksof the Brazos, and on the sides of the canal at Galveston.

Heliastus sumichrasti subrosea Caud. G., 3. Found with the *Conoza*. The absence of the pronotal carina between the sulci is not always evident.

Brachystola magna Gir. Rescue, Tex., June 8th (Coll. I. S. L. N. H.).

Dictyophorus reticulatus Thunb. C., July 20th (Coll. I. S. L. N. H.).

D. marci Serv. C., May 15th; Wellborn, Tex., June 26th (Coll. I. S. L. N. H.).

Leptysma marginicollis Serv. G., 1.

Schistocerca americana Dru. C., 8; H., 3; G., 4; C. Aug. 8 and 22, and Nov. 18 (Coll. I. S. L. N. H.). Common about trees or bushes, flying to them when disturbed.

S. damnifica Sauss. H., 8. Flies up into trees as does *americana*, but is more inclined to be tricky and exasperating.

Paraidemona mimica Scudd. C., 8; B., 1; H., 2; G., 3. In dry, sparsely grassy nooks.

Campylacantha acutipennis Scudd. C., 1; B., 1; Paris, Tex., Oct. 6 (Coll. I. S. L. N. H.). This is the infuscate form, often found associated with *C. olivacea*, and doubtfully distinct from it.

Melanoplus atlanis Riley. B., 10; C., Oct. 28 (Coll. I. S. L. N. H.). In the corner of a bottom-land cotton-field, next to a farm yard, Melanopli were remarkably abundant, attracted, perhaps, by belated plants. The species were *atlanis*, *femur-rubrum* and *impiger?*

M. scudderi texensis, n. var. C., 18; B., 2; H., 15. Common in well-sheltered spots with moderately thick grass, associated with *M. plebejus*. The length of the furcula, not at all "exaggerated" in Scudder's figure*—in some cases fully one-third the length of the supra-anal plate—the more rounded tegmina, and the very distinct lateral stripe in both sexes, seem to entitle this to varietal rank. Type in coll. I. S. L. N. H.

M. femur-rubrum DeG. C., 2; B., 3; C., Oct. 28 (Coll. I. S. L. N. H.). Infrequent. One from each locality has glaucous hind tibæ.

* Proc. U. S. Nat. Mus., Vol. XX, Pl. XIV, fig. 6.

M. bispinosus Scudd. G., 4. Open pastures among grass and short weeds. The two males agree closely with Scudder's figure* but are considerably smaller than his. The metazona is short, decidedly shorter than the prozona. The larger male measures: body, 19 mm.; antennæ, 7.5 mm.; tegmina, 15 mm.; hind femora, 10.7 mm. The other is nearly one-fifth smaller.

M. impiger Scudd.? B., 12; G., 11; C., Oct. 28 (Coll. I. S. L. N. H.). Found in open grassy ground; particularly abundant in the cotton field referred to under *atlanis*. All are females, including a number in the State Laboratory Collection, and a persistent search at each locality failed to disclose the male. In the Texas Agricultural College collection they are labeled *impiger*, but the description of this does not fit them very well.

M. plebejus Stal. C., 14; B., 16; H., 6. Associated with *M. scudderi texensis;* superficially similar, but with glaucous hind tibiæ and very unlike male structures. Those from B. were in margin of heavy forest, associated with *M. robustus*.

M. deletor Scudd. C., 1; H., 27. Grassy banks in forest. Near *luridus*, but larger. The cercal upper fork is bent up more than Scudder's key indicates.

M. differentialis Thom. C., 1; Wellborn, Tex., Aug. 25; Brazos R., July 20; C., Aug. 20 and Oct. 28 (Coll. I. S. N. H.).

M. robustus Scudd. Common in margin of heavy forest area on low, flat-bottom land, associated with *M. plebejus*.

Scudderia furcata Brunn. C., ♂, ♀ (Coll. I. S. L. N. H.). Tarsi, hind tibiæ, and tips of hind femora blackish, and the tympanum and posterior edge of tegmina fuscous. Genital structures as in *furcata*.

Microcentrum laurifolium Linn. C., Oct. 3 (Coll. I. S. L. N. H.).

Conocephalus fuscostriatus Redt. G., 1. In the folds of the beforementioned old pair of pants.

C. mexicanus Sauss. H., 1; G., 1.

Xiphidium strictum Scudd. Wellborn, Tex., June 26 (Coll. I. S. L. N. H.).

Stipator cragini Brun. Wellborn, Tex., June 26 (Coll. I. S. L. N. H.).

Nemobius fasciatus vittatus Harr. B., 1.

N. socius Scudd. C., 3; B., 6; G., 2. Apparently the commonest *Nemobius* about cultivated land. In several species of this genus an intermediate form between the long and short-winged forms has been noted, in which the tegmina are as in the long-winged forms, the dorsal field slightly projecting behind, but the wings are absent—as in Lugger's figure of *fasciatus vittatus*. One of the *socius* is of this form.

N. funeralis, n. sp. C., one female. Rather small, almost wholly black, antennæ fusco-testaceous on basal half, except the basal joint, with a few black annulations; maxillary palpi black, the penultimate

*l. c., Pl. XIX, fig. 6.

joint fusco-testaceous; a faint dark testaceous margin in front of the eye, and a small spot anteriorly on the lateral lobe of the pronotum; abdomen above with gray spots in the usual pattern. Tegmina as long as head and pronotum, rounded and slightly oblique at tip, longitudinal veins prominent, cross-veins very feeble, lateral fields black, dorsal dark fuscous, a fine yellow line on vein at lateral margin of dorsal field, continued along apical margin of lateral field. Legs black, tibiæ with testaceous interrupted line on upper face, first tarsal joint dark testaceous, black at tip; spines of hind tibiaæ testaceous at base and tip. Cerci fuscous; ovipositor short, black, nearly straight, distinctly denticulate, slightly exceeding cerci. Body 7.5 mm. long. Ovipositor 3.5 mm.; hind femora, 5.5 mm.; tegmina, 2.6 mm. Type in coll. I. S. L. N. H.

N. mexicanus Walk. C., 1.

N. carolinus Scudd. B., 1; H., 1 adult, 1 nymph.

Gryllus americanus Blatchl. B., 1; C. (Coll. I. S. L. N. H.). From what I have seen of this in Illinois, I should think it was clearly distinct. Scudder's description of *neglectus* is right for *pennsylvanicus*, but not for *americanus*.

G. pennsylvanicus Burm. G., 9; B., Mar. 22 (Coll. I. S. L. N. H.). Tegmina longer than in Illinois specimens, in the females fully reaching tip of abdomen. The B. specimen is long-winged. Of a large number of nymphs from under boards at C. and B., the majority are probably this species.

Œcanthus pini Beut. C. Coll. I. S. L. N. H.). This is the form near *4-punctatus*, but with a transverse bar on the basal antennal joint in place of the black dot, and assigned to the above species by Titus.*

On the Genus Trachykele, With Notes and Descriptions of Other North American Buprestidae.

By H. C. Fall.

TRACHYKELE Mars.

There is perhaps no genus of North American Buprestidæ concerning which so little is positively known as the one here named. Specimens are very rare in collections, our literature is almost bare of allusions to them, and foreign literature offers little more to the inquiring student. The genus was described in 1865 by Marseul, who based it upon a single specimen, said to have been found in the Custom House at Paris, emerging from a cedar of Lebanon ("Sortant d'un cedre du Liban"), by M. Blondel.

* 23d Rep. Ill. State Ent., p. 218.

This locality seems to have been early discredited, for in the Catalogus of Gemminger and Harold (1869) the locality New Orleans is given for the species. I have been unable to discover the origin of this change, but it is doubtless connected with the fact that there is in the LeConte collection a pair of elytra fastened to the body of another Buprestide, and bearing the legend in Salle's handwriting "The elytra alone are from *blondeli*" and the locality label "Nlle Orleans."

In the Catalogus the *Buprestis lecontei* of Gory (1840) is also and properly referred to this genus, but with the locality "Am. Bor." instead of Mexico as originally given by Gory. Coming down to the "Biologia," the locality of *blondeli* has again been changed, for here we read—"Said to come from Mexico, but there is some doubt of the correctness of this locality. There is a single example in the British Museum without locality, here figured." This figure, Mr. Blanchard writes me, agrees very well with the elytra in the LeConte collection.

In his treatment of the Buprestidæ in Wytsman's Genera Insectorum, Kerremans states with apparent assurance that *blondeli* is from Mexico, and that it is identical with Gory's *lecontei*. It is difficult to know what to make of this statement, since Kerremans admits he has never seen a specimen of the genus and yet gives no authority for his assertion. He pronounces Gory's description as insufficient and his figure unrecognizable and not at all like that given by Waterhouse in the Biologia. Gory's description is short and unsatisfactory, it is true, but it is sufficiently characteristic to warrant our saying that the single examples of *lecontei* in the LeConte and Horn Collections—from Georgia and Louisiana—respectively, are the real thing and a very different thing from *blondeli*. The lack of correspondence between Gory's and Waterhouse's figures is not at all surprising.

Assuming that the *blondeli* elytra in the LeConte collection are correctly labeled, there yet remain two undescribed species from our Pacific Coast region, consideration of which has prompted this investigation. One of these is a green species resembling *blondeli*, and the few specimens known have, I be-

lieve, been so referred; the other, a dark bronzed form, is more like *lecontei*, and has so passed, but it is larger than that species, and in some other respects quite different. The following descriptions and notes will help to make these fine Buprestides better known to our collectors and students of our Coleoptera.

Trachykele opulenta n. sp.

Green of varying brilliancy and with more or less evident golden or coppery glints at some part of the surface; disk of elytra maculate with small velvety black spots which vary much in size and number, but which show a tendency toward arrangement in longitudinal lines extending from the basal to the apical fourth. Upper surface glabrous and extremely densely not coarsely punctate; beneath with fine rather sparse whitish pubescense, densely punctate anteriorly, apical portion of abdomen more sparsely so. Front uneven, vertex impressed each side, carinate at middle. Prothorax nearly one-half wider than long, the length subequal to the width at apex, base a little wider, sides (superior lateral crest) broadly but distinctly angulate just behind the middle, disk with three anterior impressions and two large and deep posterior ones, the median lines sometimes narrowly smooth posteriorly and terminating in a small antescutellar fovea. Elytra about four times as long and one-third wider than the prothorax, humeri rather prominent; sides parallel to behind the middle, thence gradually narrowed; apex narrowly subtruncate and a little oblique; disk with from one to three short or incomplete sulci parallel with the suture, one or all of which may become nearly or quite obsolete. Sterna and first ventral segment very densely punctate and dull, following segments more sparsely finely punctate and shining, especially at middle. Length, 16-20 mm.; width, 5-6½ mm.

In the male the antennæ are a little longer than the head and prothorax; the front and middle tibiæ are slightly curved and denticulate within, and the fifth ventral is squarely truncate.

In the female the antennæ scarcely pass the base of the prothorax; the tibiæ are nearly straight and denticulate within, and the fifth ventral is rotundate-truncate.

Hab.—South Central Sierras of California to Washington (State). I have seen six examples (1 ♀, 5 ♂ s) of this beautiful species, all but one of which were taken by Mr. Ralph Hopping in the Giant Forest region, Tulare Co., California. Of these Mr. Hopping writes, "One was beaten from the foliage of *Pinus lambertiana* at 6,000 ft.; others were caught flying in the Giant Forest at 6,400 ft., and one was cut from the burnt standing mast of a *Libocedrus decurrens* (Incense Cedar)

at 5,000 ft. This latter was in its own burrow and there would seem to be no doubt that *Libocedrus* is a food tree of the species." The sixth specimen bearing the label "Three Rivers, Cal." is from the same region, and was recently submitted without notes by Prof. C. F. Baker. I learn on inquiry that Mr. Fuchs has a single ♀ of this species from Seattle, Wash., and there is also a "W. T." example in the Horn collection. Miss Julia Wright has taken two examples at Towles, Placer Co., Cal., (fide Blaisdell). Dr. Van Dyke says, "I have never collected a live Trachykele, but have two green wing cases, one taken from, I think, a yellow pine stump at Sesson, Shasta Co., the other in Tuolumne Co." (California).

T. blondeli Mars.

The description of Marseul applies about equally well to the species above described, and to a form of which I have seen two examples received by Dr. Fenyes from Santa Fe., New Mexico. Specimens of each were accordingly sent to Mr. Frederick Blanchard, who has kindly compared them with the *blondeli* elytra in the LeConte collection. Mr. Blanchard reports that the Santa Fe specimen is of a more brilliant green but otherwise so closely in accord with *blondeli* that he thinks there can be scarcely a doubt of their identity. The two species are quite similar in most respects, but on comparison *blondeli* differs plainly from *opulenta* in its distinctly coarser, less dense punctuation and consequently more shining surface, in the more strongly angulate lateral crest and deeper excavations of the pronotum. There is on each elytron of *blondeli* at about two-fifths from the apex and midway between the suture and side margin, a small transverse impunctate cariniform elevation or tumidity, no trace of which exists in *opulenta*. Some other small differences are observable but they are comparatively unimportant and perhaps not constant. The Santa Fe specimens are respectively 14 and 17 mm. in length; the LeConte elytra indicate a still larger specimen. It is quite probable that the Santa Fe species ranges south into Mexico, and to this extent tends to confirm the locality given by Water-

house and Kerremans for *blondeli*. On the other hand, it seems unlikely that a species living on coniferous trees at an altitude of 7,000 or 8,000 ft. in the Rocky Mts. is also a native of the lowlands adjoining the Gulf of Mexico. The New Orleans specimen may therefore have been imported in timber; it should, however, be remembered that *T. lecontei* is also reported from Louisiana.

T. nimbosa n. sp.

Very similar in form and size to *blondeli*, of a dull bronze, with sparse subsquamiform pubescence; the elytra numerously irregularly immaculate with opaque velvety black spots, three of which in a longitudinal line on each elytron are larger and occupy more pronounced impressions. Head and prothorax densely punctate and impressed as usual in the genus; the pronotal excavations fully as deep as in *blondeli*, the lateral crests even more strongly angulate than in that species. Elytra each with three or four feeble costæ more or less interrupted by the impressions, the surface alutaceous and moderately closely punctate, the punctures not crowded as in *blondeli* or more especially in *opulenta*. Beneath more conspicuously pubescent, sterna densely punctate and dull, the abdomen shining brilliant coppery bronze, the first segment sparsely finely punctate, the following ones minutely and remotely so.

Length, 15-17 mm.; width, 4½-5½ mm.

Hab.—This species ranges from Tulare Co., California, to British Columbia.

Three examples—all ♀s—are before me, two taken by Mr. Hopping at "Marble Bridge" (5,200) and "Round Meadow, Giant Forest," Tulare Co., California. The third specimen was taken by Dr. Fenyes at Glen Alpine (7,000 ft.) near Lake Tahoe, Cal. The elytra of the latter specimen are completely devoid of pubescence, as is the case in a specimen in the LeConte collection from British Columbia, which, however, Mr. Blanchard believes is identical with the Marble Bridge specimen, which I have taken as the type.

Mr. Hopping informs me that the specimens taken by him —three in all—were found flying in the Giant Forest, and he does not know their food tree. Dr. Fenye's example was found on the trunk of a fallen coniferous tree which, from memory, he believes to have been a spruce, certainly not a pine. Mr. Fuchs writes me that he once had specimens of this species (which he speaks of as *lecontei*) from Tuolumne,

Plumas and Shasta Cos., Cal., but that these are now in the Ulke collection. The Shasta specimen he thinks was taken on yellow pine (*Pinus ponderosa*).

T. lecontei Gory.

I learn from Dr. Skinner that there is a single example of this species in the Horn collection, and from Mr. Blanchard that the LeConte collection contains a single ♂, the following description of which he has kindly sent me.

"Very much smaller and more parallel in form (than *nimbosa*), the prothorax not at all expanded at sides. Front of head similar to the last, the carina and impressions less strongly marked. Thorax somewhat quadrate, apex and base nearly equal in width, sides broadly feebly arcuate, slightly sinuate behind, the angles arcuate; margin slightly inferior towards the front; surface impressed similarly to the last, finely and densely punctate except the convexity between the posterior impressions, which is impunctate. Elytra somewhat flattened, substriate near the suture, an irregular blackish subtransverse impression at anterior fourth, from outside the middle to the suture, a smaller more rounded one just behind the middle, distant from the suture, and a still smaller oblique one behind the last at posterior third; surface finely rugose and closely punctate, deeply impressed behind the humeri next to the margin; dull bronze varied with coppery. Prosternum feebly impressed, flat, abruptly tumid in front as in the other species; coarsely, densely, more or less asperately punctate, as is also the meso- and metasternum; abdomen finely, sparsely punctured and pubescent. Punctures of elytra bearing depressed inconspicuous scale-like hairs; sides of prothorax more abundantly hairy, especially behind; similar hairs beneath anteriorly and at sides, finer more hair like on the abdomen. Last ventral truncate and narrowly smooth and depressed at apex. Front and tibiæ slightly arcuate and asperate within, but less regularly and distinctly so than in *opulenta*. Length, 9 mm.; width, 3.2 mm.

Hab.—Georgia (LeConte Coll.); Louisiana (Horn Coll.).

The more obvious diagnostic characters of our four species are expressed in the following table:

Green; first ventral segment very densely punctate.

Upper surface very densely punctate, side margin (lateral crest) of prothorax moderately angulate. (California to Washington) . . . . . **opulenta.**

Upper surface less densely, more coarsely punctate; side margin of prothorax strongly angulate (New Mexico; Mexico? New Orleans??) . . . . . **blondeli.**

Bronzed; first ventral segment rather sparsely finely punctate.
Lateral crest of pronotum well developed and strongly angulate, size larger, 15–17 mm. (California; British Columbia). . . . . **nimbosa.**
Pronotal crest obsolete, sides not angulate; size smaller, 9 mm. (Georgia; Louisiana) . . . . . **lecontei.**

POLYCESTA.

In the January number of the Canadian Entomologist, p. 22, Mr. Schaeffer questions the correctness of my observation (ENT. NEWS, 1905, p. 73) as to the form of the last ventral segment in males of *californica*, his suspicions being based solely on his study of other species of the genus. In every student's experience instances have occured where it is much easier to believe a published statement the result of an observational error, than to believe that an insect departs in some particular from a type known to prevail in allied forms. Mr. Schaeffer's doubts are perhaps natural enough, but they are in this case ill-founded, and I am able to state after a renewed examination, that the facts are precisely as recorded by me in the article cited. In my own collection and that of Dr. Fenyes are 8 ♂ s and 4 ♀ s of *californica*. In none of the males is the apex of the last ventral produced in the form of a broad obtuse parallel sided lobe (as is the case in every one of the 5 ♂ s of *elata* at hand), the apex of the segment being very slightly subtriangularly prominent, the sides scarcely at all sinuate, the tip narrowly rounded or subangulate. I should have mentioned in my original notes a very obvious sexual character pointed out to me by Mr. Blanchard, which *elata* and *californica* possess in common. In these two species the first ventral segment is broadly swollen or tumid at middle throughout its length, the punctuation of this convexity being much finer and sparser than the same segment in the female. In *velasco* and *arizonica* Schaef. this segment is not sexually modified. The Yuma male previous referred to by me under *velaso*, is without much doubt Schaeffer's recently described *arizonica*. These two forms are certainly very closely allied; so closely that I somewhat doubt their being more than varietal forms of the same species.

MASTOGENIUS.

Mastogenius impressipennis n. sp.

Larger than *subcyaneus*, black, slightly bronzed, nearly glabrous, moderately shining. Head with violaceous tint, rather strongly convex, closely coarsely punctate, with a rather deep circular median fovea. Antennæ just passing the hind angles of the prothorax, slender, serrate from the fourth joint, second joint globose; third small, much longer than wide, subequal in length to the second and scarcely more than half as long as the fourth; intermediate joints fully twice as long as wide. Prothorax two thirds wider than long, widest at apical third, sides feebly arcuate and a little convergent behind, more strongly rounded in front, hind angles very slightly obtuse; surface evenly convex, a small foveiform impression near the middle of the side margin; punctuation rather coarse and very dense, with slight tendency to transverse strigosity; a very fine and faint median impressed line which reaches neither base nor apex. Elytra as wide as the basal width of the prothorax, sides parallel for three-fourths their length, surface a little more coarsely but less densely punctate than the prothorax, rather deeply and narrowly impressed along the basal margin, and each with three discal impressions, the anterior one subsutural. Beneath strongly closely punctate, less closely toward the ventral apex. Posterior margin of hind coxal plates broadly sinuate. Length, 3½ mm.

El Taste, Lower California (Beyer).

Mr. Schaeffer has recently described two species of this genus, viz.: *reticulaticollis* from Brownsville, Tex., and *robustus* from Arizona. From the former of these *impressipennis* may at once be distinguished by the prothoracic and elytral sculpture, and from the latter by the impressed front, less transverse prothorax, and antennal structure. *Subcyaneus* differs much by its smaller size, sparser punctuation, differently formed prothorax, antennal structure, etc. Three other species of the genus are known, viz.: *Solieri* Thom., from Brazil, and *sulcicollis* Philippi and *parallelus* Sol. from Chile. The last mentioned differs from all of our species by the parallel-sided thorax, which is as long as wide; *sulcicollis* is separable by the sulcate thorax, as its name indicates; of *solieri* I have seen no description.

AGRILUS.

Agrilus lucanus n. sp.

Rather strongly cuneiform, color dark coppery bronze, elytra with short fulvous appressed hairs, forming an obscure basal spot, a diffuse median band, a narrower better defined fascia near the apical fourth, and

a small subapical spot connected with the latter along the suture. Antennæ slender, not quite reaching the hind angles of the prothorax, joints 1-7 longer than wide, 8-10 as wide as long, the serration beginning with the fourth joint. Head rather deeply unevenly impressed, coarsely closely punctate, the punctures tending to form short strigæ at some points. Prothorax transverse, sides straight and parallel posteriorly, feebly arcuately narrowed in front, not sinuate before the hind angles, which are strongly carinate; median line deeply broadly impressed, the concavity constricted near the middle and narrowed in front; surface transversely strigose at middle, obliquely at sides; side margin sinuous when viewed laterally. Scutellum carinate. Elytra not sinuate at sides, just visibly narrowed to behind the middle, thence more strongly so to apex, the tips obliquely sinuato-truncate interiorly, margin acutely serrate; disk flattened along the suture, the depression limited externally by a well-defined costa. Beneath with sparse yellowish pubescence which is not condensed at sides. Prosternal lobe rather strongly emarginate.

Described from a single specimen given me by Mr. Beyer, by whom it was taken at El Taste, Lower California. The type is a ♂, having the prosternum densely hairy, but without ventral characters. The front and middle tibiæ are mucronate at tip as usual; the hind tibiæ may also be armed but the tips are not visible as mounted. The front and middle claws are cleft at tip, the posterior with a broader more basal tooth.

Lucanus would best stand near *cavatus* as tabulated by Horn. In general facies, and especially in the form of the elytral apices it departs from the prevailing northern type and approaches that of the Mexican species. Dr. Horn is decidedly in error in saying* that the tibiæ are unarmed in the females of all our species of *Agrilus*. In many species the tibiæ in this sex are armed, the spur or mucro differing from that in the male only in being shorter and less conspicuous; it is, however, plain enough in the larger species, especially on the middle and (when present) hind tibiæ. I have not attempted to verify the presence of the terminal spur throughout the genus, but the following species among others well illustrate the point in question. *Couesii*, *cavatus*, *vittatocollis*, *bilineatus*, *angelicus*, *arcuatus*, *acutipennis*, *walshinghami*, *politus*, *niveiventris*.

*Trans. Am. Ent. Soc. XVIII, p. 281.

Notes on the True Neuroptera.

By J. F. McClendon.

(Plate VIII)

3. *A Catalogue of Texas Neuroptera.*

Very few Neuroptera have been recorded from Texas, and I am writing the following list in the hope that it will encourage others to make a more thorough study of this interesting group in that region. Through the kindness of Dr. Samuel Henshaw I was allowed to examine the specimens in the Museum of Comparative Zoology, and Dr. L. O. Howard and Mr. R. P. Currie gave me every facility in looking over those in the National Museum. Mr. Nathan Banks, Asst. Entomologist, Dept. of Agriculture, let me study his collection, which contains more Texas material than that of any museum I have visited. Most Texas material is scanty and merely labeled "Texas," and in some cases the genus only could be identified. Where the collector's name was not known I have inserted the name of the owner or donor of the specimens. In many cases I refer to a monograph rather than the original description of a species, and have omitted the author's name where it is included in the name of the species.

SIALIDÆ.

SIALIS Latr. (*Sialis* sp.? Austin, McClendon).

CORYDALIS Latr.

cornuta Linn., Hagen, '61,* Columbus, E. A. Schwarz; Austin, McClendon.

Fig. 1.—*Corydalis texana*, dorsal view of head and neck.

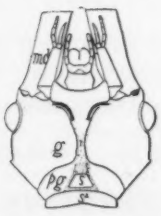


Fig. 2.—*Corydalis texana*, ventral view of head and neck.

Fig. 3.—*Corydalis texana*, labium and hypopharynx of larva.

*Synopsis of Neuroptera of North America, by Hermann Hagen, Smithsonian Institute.

cognata Hag., '61.* Pecos River, Hagen.
crassicornis McLach., '67, Jour. Linn. Soc. Zool., v. 9, p. 233, San Antonio, A. Agassiz.
immabilis McLach., '67, Jour. Linn. Soc. Zool., v. 9, p. 235, Waco, Belfrage.
texana Banks, Jour. N. Y. Ent. Soc., v. 11, p. 239, Laredo, McClendon.

Fig. 4.—*Corydalis texana*, ventral view of thorax.

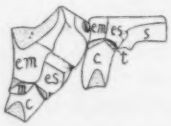


Fig. 5.—*Corydalis texana*, lateral view of thorax.

Fig. 30.—*Corydalis texana*, tergites of the thorax.

RAPHIDIDÆ.

RAPHIDIA Linn.

oculata Banks, '05, Trans. Am. Ent. Soc., v. 32, p. 4, Austin, McClendon.

MANTISPIDÆ.

MANTISPA Ill.

brunnea Say, Hagen, '61, Dallas, Riley; Victoria, Hinds, Morrill; San Antonio, Marlatt.
interrupta Say, Hagen, '61, Victoria, Caudell; Brownsville, E. A. Schwarz, H. Barber; San Antonio, Banks; Austin, McClendon.

CONIOPTERYGIDÆ.

CONIOPTERYX Halid. (*Coniopteryx* n sp., Brownsville, Barber).

CHRYSOPIDÆ.

LEUCOCHRYSA McLach.

antennata Banks, '05, Trans. Am. Ent. Soc., v. 32, p. 5, Brownsville, H. Barber.
americana Banks, '97, Proc. Ent. Soc. Wash., v. 4, p. 175, Austin, McClendon.

CHRYSOPA Leach.

oculata Say, Hagen, '61, Austin.
rufilabris Burm., Hagen, '61, Columbus, Schwarz; Victoria, Schwarz; Austin, McClendon.

quadripunctata Burm., Hagen, '61, Austin, McClendon.
sulphurea Fitch, Hagen, '61, Austin, McClendon.
plorabunda Fitch, Hagen, '61, Greenville, H. Barber; Austin, McClendon.
externa Hagen, '61, Greenville, H. Barber; Austin, McClendon.
punctinervis McLach., '69, Ent. Month Mag., '69, p. 24, Texas, McLach.
bimaculata McClendon, '01, Psyche, v. 9, p. 215, Brownesville, H. Barber; Austin, Banks; San Antonio, Banks; Laredo, McClendon.

HEMEROBIDÆ.

HEMEROBIUS Linn.

castaneæ Fitch, Hagen, '61, Texas, Belfrage.
perparvus McLach., '69, Ent. Month. Mag., '69, p. 21, Texas, McLachlan.

MICROMUS Rambur.

angustus Hagen, '86, Proc. Bost. Soc. Nat. Hist., '86, p. 287, Texas, Belfrage.
insipidus Hagen, '61, Columbus, Schwarz.
posticus Walk., B. M. Cat., Neur., p. 283, Victoria, Schwarz; Austin, McClendon.

CLIMACIA McLachlan.

areolis Hagen, '61, Columbus, Schwarz; Texas, Belfrage.

LOMAYIA Banks.

texana Banks, '97, Trans. Am. Ent. Soc., v. 4, p. 24, Brownsville, H. Banks; Central Texas, Banks.

MYRMELEONIDÆ.

(MYRMELEONINÆ.)

ACANTHACLISIS Rambur.

texana Hagen, '87-8, Canad. Ent., p. 197, Texas, Hagen.

DENDROLEON Hagen.

obsoletus Say, Hagen, '61, Blanco Co., Am. Ent. Soc.

PSAMMOLEON Banks.

ingeniosus Walk., Hagen, '61, Columbus, Riley; Brownsville and Alice, Barber; Blanco Co., Am. Ent. Soc.; Austin, McClendon.

BRACHYNEMURUS Hagen.

carrizonus Hag., '87-8, Canad. Ent., p. 93, Blanco Co., Am. Ent. Soc.; Brownsville, H. Barber; San Diego, Schwarz; College Station, Banks; Carrizo Springs, Hagen; Austin, McClendon.

abdominalis Say, Hagen, '61, Brazos Co., Banks; Victoria, W. E. Hinds; Alice, H. Barber; Blanco Co., Am. Ent. Soc.; Dallas, Boll; Carrizo Springs, Hagen; Austin, McClendon.
longicaudus Burm., Hagen, '61, Texas, Riley.
peregrinus Hag., '61, Matamoros, Hagen.
sackeni Hag., '87-8, Round Mountain, Am. Ent. Soc.; Dallas, Boll.
irregularis Currie, '06, Proc. Ent. Soc., Wash.; Columbus, Schwarz.
hubbardi Currie, '98, Canad. Ent., v. 30, p. 93.=*cockerelli* Banks; Carrizo springs, Dr. A. Wadgymar; Columbus, Am. Ent. Soc.
texanus Banks, '03, Jour. N. Y. Ent. Soc., '03, p. 240, Amarillo, Cockerell; Laredo, McClendon.
dorsalis Banks, '63, Jour. N. Y. Ent. Soc., '03, p. 240, Laredo.
curriei McClendon, '06, ENT. NEWS, v. 17, p. 93, Brownsville, Esperanzo, Los Barregos, Barber.

MYRMELEON Linn.

immaculatus DeGeer, Hagen, '61, Texas, Hagen.
rusticus Hagen, '61, Brownsville, H. Barber; Victoria, Caudell, J. Mitchell, Schwarz; Columbus, San Diego, Schwarz; Pecos River, Hagen; Matamoros, Hagen; Austin and Laredo, McClendon.
texanus Banks, '00, ENT. NEWS, v. 11, p. 596, Columbus, Schwarz; Galveston, McClendon.

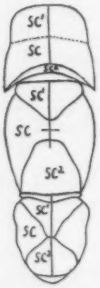


Fig. 31.—*Myrmeleon rusticus*, tergites of the thorax.

NEUROPTYNX n. gen. (= *Ptynx* Lefeb., preoccupied).

juvenilis McLach., '71, Jour. Linn. Soc. Zool., Dallas Boll.; Austin McClendon.

ULULODES Currie (*Ulula* Ramb.)

hyalina Latr. Hagen, '61, Dallas, H. Barber, Boll.; Austin, A. W. Morrill, McClendon; Bosque Co., Belfrage; Columbus, Schwarz; Waco, Galveston and Laredo, McClendon; Brownsville, H. Barber.

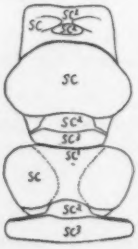


Fig. 32.—*Panorpa nuptialis*, tergites of the thorax.

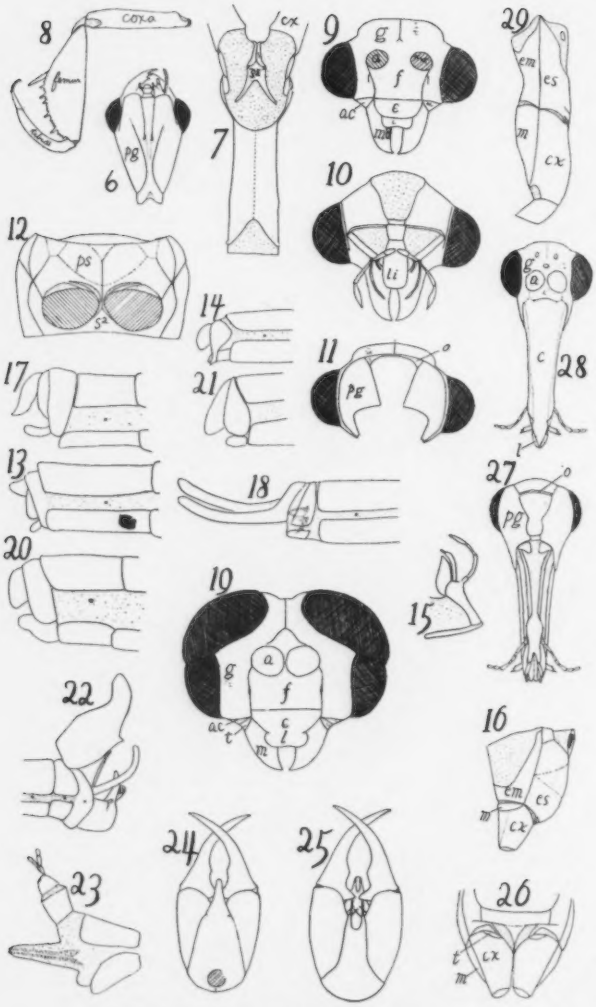
PANORPIDÆ.

BITTACUS Latr.

occidentis Walk., Hagen, '61, Texas, Banks.

PANORPA Linn.

nuptialis Gerst., '63, Stet. Ent. Zeit. '63, p. 24, Jonesville, Mally; College Station, Banks; Victoria, Calvert, A. W Morrill; Dallas, Boll; Austin, McClendon, Norman.



THE TRUE NEUROPTERA McCLENDON.

EXPLANATION OF FIGURES.

The accompanying figures are intended to illustrate some points in the external anatomy. Where appendages are cut off, the cut surface is usually shaded with parallel lines. Membranous parts are shaded lightly with dots.

ABBREVIATIONS.

a. Antenna.	*g.* Gena.	*ps.* Presternum.
ac. Antecoxal piece.	*gu.* Gula.	*s.* Sternum.
c. Clypeus.	*l.* Labrum.	s^2 Sternellum.
c^1. First Clypeus.	*li* Labium.	sc^1. Prescutum.
c^2. Second Clypeus.	*m.* Meron.	*sc.* Scutum.
cx. Coxa.	*md.* Mandible.	sc^2 Scutellum.
em. Epimeron.	*mx.* Maxilla.	sc^3. Postscutellum.
es. Episternum.	*o.* Occiput.	*sp.* Spiracle.
f. Front.	*pg.* Postgena.	*t.* Trochantine.

EXPLANATION OF PLATE VIII.

Fig. 6. *Raphidia oblita*, ventral view of head.
" 7. *Mantispa brunnea*, ventral view of prothorax.
" 8. " " anterior leg.
" 9. *Myrmeleon rusticus* dorsal view of head.
" 10. " " ventral " " "
" 11. " " posterior view of head.
" 12. " " ventral " " mesothorax.
" 13. " " caudal appendages of female.
" 14. " " " " " male.
" 15. " " maxilla.
" 16. " " lateral view of mesothorax.
" 17. *Brachynemurus carrizonus*, caudal appendages of female.
" 18. " " " " " male.
Inner parts shaded.
" 19. *Ululodes hyalina*, head.
" 20. " " caudal appendages of female.
" 21. " " " " " male.
" 22. *Bittacus strigosus*, " " " "
" 23. *Panorpa nuptialis* " " " female; the abdomen is pressed so as to extrude the ovipositor, which is semi-transparent.
" 24. " " caudal appendages of male, dorsal view.
" 25. " " " " " " ventral view.
" 26. " " ventral view of mesothorax.
" 27. " " anterior view of head.
" 28. " " posterior " " "
" 29. " " lateral view of mesothorax.

On the Perlid Genus Chloroperla.

By Nathan Banks.

The genus *Chloroperla* was first described by Newman in the third volume of the Entomological Magazine, page 500; the number for April, 1836. He separates the genus from *Perla* because the subcosta and costa are parallel, and on account of the few cross-veins in this region of the wing. He says that the genus includes several species, and mentions *Ch. viridis* Fabr., and *Ch. lutea* Latr., and describes a new form *Ch. apicalis*. In August, 1836, appeared part of Vol. VI, Mandibulata, of Stephens' well-known "Illustrations," containing, on page 137, the genus *Chloroperla* Newman MSS. This, however is not important as Newman's own publications of the name antedates Stephens by several months; so that the type of the genus must be found among the three names given by Newman. In 1839 (Mag. Nat. Hist., n. ser., Vol. III, p. 87) Newman again treats of the genus *Chloroperla*, dividing it into two sections, aberrant and normal species. Among the normal species are the three names of his first article; *viridis* Fabr., and *lutea* Latr., appearing as synonyms of *C. flava* Fourc., a possible synonym of *C. tripunctata* Scop. This synonomy is not accepted by European authors, and the three names of Newman's first paper on *Chloroperla* are reduced to *tripunctata* Scop. and *apicalis* Newm. Both of these species are placed in the genus *Isopteryx* by the European writers on Perlidæ. Therefore *Chloroperla* Newm., 1836, replaces *Isopteryx*, Pict. 1841. *Chloroperla* of authors has no synonyms; the species of *Leptomeres* Rambr., and *Dodecatoma* Dufour, are placed in *Isopteryx*. So the *Chloroperla* of Pictet and later authors is without a name.

In Bull. No. 47, N. Y. State Museum, 1901, page 417, Mr. Needham divides the family Perlidæ into two subfamilies—Perlinæ and Nemourinæ. He bases these groups on the condition of the median vein near base of wing; fused with the radius in the Nemourinæ, distinct and parallel to the radius in the Perlinæ. There are various exceptions to this rule in both groups, but especially among those forms previously placed in the genus *Chloroperla*. This character is not of suf-

ficient constancy to divide the family into two subfamilies, but I think it may well be used as of generic value to divide the *Chloroperla* of authors into two genera. I therefore do so, using the name *Isoperla* for those forms having the median vein extending basally parallel to the radius, and *Alloperla* for those forms having the median united to the radius at base. The *Perla bilineata* Say, will be the type of *Isoperla*, which includes also *transmarina* Newm., *montana* Bks., *5-punctata* Bks., *brunneipennis* Walsh, and *decolorata* Walk. The *Perla imbecilla* Say, will be the type of *Alloperla*, which includes also *coloradensis* Bks, *pacifica* Bks., *signata* Bks., *borealis* Bks., *brevis* Bks., *minuta* Bks., *marginata* Bks., and *pallidula* Bks. *Alloperla* differs chiefly from *Chloroperla* (*Isopteryx*) by having a folded anal space to the hind wings.

Notes on Papilio ajax.

By R. R. Rowley, Louisiana, Mo.

It is not the writer's intention in this paper to tire his readers with a lengthy description of the stages of larval growth, since these have been carefully worked out by others and the results published, but to record his observations on the habits of the larva and the imago, with the hope that young collectors at least may gather some inspiration from these notes.

Wherever papaw grows there *ajax* is usually abundant throughout much of the summer months and from late May to mid-September this fine swallow-tail may be seen flitting aimlessly though the bushes, rarely stopping for a moment.

Even when very abundant, it is not easy to take this "fly," and nine out of every ten are so injured as to be worthless for cabinet purposes. So fragile are the wing tails that they are often broken in the meshes of the net.

In June of 1900, a veritable *ajax* year, I took a great number of these butterflies by decoys. A few ragged specimens taken on the wing were killed and spread upon the ground and leaves of low bushes along a path through the papaw patch where they could be seen by the stream of flitting "flies" above.

Restless as their flight seemed to be, many came down to the decoys and were easily taken.

Trying this trick on another year when the butterflies were less abundant, the ruse was almost a failure. In June of last year I was able to collect numbers of the eggs and young larvæ and thus secure over a hundred chrysalids from which I obtained less than a score of butterflies, the greater number of pupæ holding over to the next year. These eggs and larvæ were collected at intervals of a few days each from mid-June to mid-August, and the first chrysalids obtained about July 10th.

Several even of this first lot of pupæ have not yet given butterflies nor will till spring.

No chrysalids gave imagoes inside of three weeks. In company with Mr. E. A. Dodge on June 10th last, I observed an *ajax* ovipositing, mentally marked the leaves and, while one of us collected the eggs, the other followed the butterfly and thus we were able to secure a dozen or more ova of the same female.

We were surprised to find that she visited only low young plants, and even then oviposited only on the tender end leaves on the upper side (very rarely on the underside), sometimes, however, on the leaf stalk, once on a blade of grass near the papaw plant.

We had learned well a lesson, and after losing sight of our tutor, waded into the teasel patch in search of young papaw sprouts. We were abundantly rewarded with eggs and an occasional very young larva.

The smaller and tenderer the sprouts the greater the reward. The very small black caterpillars strongly reminding one of the larvæ of tree hoppers, were discovered on the underside of the small tender end leaves, their presence indicated by the small perforations seen on the upper side of the leaves. The larger larvæ were always found on the upper side of the leaf, that is after the first or second month, to maturity.

Once seen the eggs are often seen by keen eyes, even without stooping, but the leaves must be turned to find the freshly hatched larvæ.

In July we found eggs and larvæ on somewhat larger bushes, say two to four feet high, and on leaves below the tender end ones. Later in the year when fresh leaves are scarce all the foliage of the bushes was searched with success, but the trees (ten to twelve feet high) rarely yielded anything.

The eggs are little larger than mustard seeds, spherical, pale green or sometimes streaked or blotched with red, a feature often noticed on the eggs of such sphinges as *Smerinthus geminatus*, *S. myops*, *S. excæcatus*, and *S. modestus*. The black eggs we saw were, doubtless, parasitized.

In the searches for eggs and larvæ of *ajax*, eggs and larvæ of the "hawk," *Dolba hylæus* were often found, these latter eggs differing from the former in size, mainly being deposited on the underside of the leaf (rarely on the upper side).

Of course there is no mistaking the larva of *Dolba*, as it is pale green, slender, with caudal horn and sphingial bands. In all stages of the larva of *ajax* the thoracic region is swollen. The odor from the retractile thoracic tubes of the larva of *ajax* is stronger than and entirely different from that of other *Papilio* larvæ with which the writer is acquainted.

Of the chrysalids we obtained, about one-twelfth only were green, the rest being light reddish or yellowish-brown.

Like other Papilios, *ajax* is often seen in great bunches at damp, sandy or muddy places, but more rarely at flowers. The seasonal variation in this insect is well-known to collectors as also the differences in the depth of the coloration.

Stemmed Cocoons of Telea polyphemus.

By Dr. R. E. Kunzé, Phoenix, Arizona.

During the season of 1889 and including 1892, I collected immense numbers of Saturnian cocoons, within a radius of two to ten miles from New York City, which were exchanged at home or sent abroad. The localities included the banks of the Harlem River, Palisades, the Hudson, swamps of the Hackensack and the Passaic Rivers, low lands of the tongue of land between New York and Newark Bay, Staten Island, Flatbush, Brooklyn and Long Island City.

As a rule I found most of the stemmed *polyphemus* cocoons on the lowermost limbs of shade trees, such as the cut-leaved maple lining the streets and avenues of cities. This habit of fastening such coccons on trees of public highways, must be accounted for in my mind as a protection against birds, as well as being stepped upon or crushed by pedestrians and vehicles.

On the other hand the same cocoons spun up in the leaf of white birch, nine times out of ten, would be defoliated and drop to the ground, where, if not destroyed by mice, would develop into imagines of this race unless parasitized.

I very seldom found a stemmed cocoon on white birch, and collected hundreds by turning over leaves in the winter under low-growing bushes, and usually on the banks of streams or the roadside of suburban parks.

Quite the contrary with stemmed cocoons found on low trees of bush-like growth of swamp or pin oak. I will recall a locality in the heart of a suburb of Jersey City, known then as Bayonne, on a narrow stripe of land bordering on New York Bay on the east, and Newark Bay west of it. Only two blocks from the New Jersey Central R. R., with handsome residences all around, were two squares, where the topography admitted of no residences. The year round this ideal winter collecting ground was under water from 12 to 18 inches deep, and sheltered birds, butterflies and moths. There must have been warm springs in these two city blocks, because only on the coldest days, with the mercury near the zero mark, could I venture to collect in this marshy place. Thus being less than a quarter mile from either bay, the property could not be drained.

In this swamp I collected one winter, mostly in January, some two hundred and fifty cocoons of *polyphemus* alone, hundreds of *promethea* and a few of *cecropia* cocoons. During the same winter I sent to Prof. Levi P. Mengel, of Reading, Pa., 350 cocoons of *polyphemus*, and over 3000 *cecropia* cocoons, all collected with the exception of *polyphemus* on Jersey City Heights and environs. To refer back to *polyphemus* cocoons I collected from swamp oak, they were dangling from defoliated branchlets like nuts from a Christmas tree.

It seems to me that the larva of *polyphemus* took this manner of spinning up on the branchlets of this oak, to prevent its falling in the water, where in due course of time it would have frozen to death. About one mile from Bayonne, at a suburb known as Greenville, I found on higher ground, hundreds of white birch bushes, with almost every cocoon of *polyphemus* spun in leaf and certain to drop below during autumn gales.

I wish to add my testimony regarding the habit of *T. polyphemus*, for the safety of this race, which I was put in mind of by a note by Miss Caroline Soule, in the December ENT. NEWS, Vol. XVI.

EDITORIAL NOTE.—We do not believe this caterpillar sufficiently intelligent to make stemmed cocoons over highways. The absence of the ordinary cocoons in such places is accounted for by the fact that they would rapidly be swept away by the ordinary traffic of the street or highway after they fell to the ground.

A MALPIGHIAN TUBE WITHIN THE HEART.—A few days before reading Dr. Riley's article with this title in the April NEWS, page 113, I had given out, to my class in Invertebrate Zoology, some transverse sections of a grasshopper. On looking at one of the students' slides I noticed two sections of a Malpighian tube within the heart, but thought their presence there to be due to displacement in clearing the sections and dissolving the paraffin. Dr. Riley's article recalled this appearance and when the class met to study the sections, I at once saw that we had another of those apparently rare cases which Dr. Riley has described. Fortunately, I still had enough sections of this grasshopper on hand to give the following account of the course of this Malpighian tube. It entered the ventral surface of the heart by a cardio-coelomic aperture, at a level slightly in front of the hind end of the stomach, passed forward, within the heart, to a level slightly anterior to that of the hind end of the gastric coeca, bent upon itself and passed backward, still within the heart, to at least as far as the level of the anterior part of the rectum. A gap in the available sections of this region exists so that I am unable to state whether the tube terminated within the heart, or whether it passed out into the pericardial chamber as in Kowalevsky's case reported by Dr. Riley. This grasshopper was also a *Melanoplus*, probably *M. femur-rubrum*, and a female. I do not recall having seen any other instance of a Malpighian tube within the heart, and I would endorse Dr. Riley's view that such occurrences are accidental.—PHILIP P. CALVERT, University of Pennsylvania, Philadelphia.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., MAY, 1906.

Several times we have published comments on articles noticed in medical journals and called attention to the necessity of medical colleges giving a course on the principles of entomology, in view of the fact that so many diseases are carried by insects. The quotation below is from the April, 1906, "Medical Brief," page 282, and carries us back before the time of Dr. Francesco Redi, who lived about 1618. It has been questioned whether such a statement as that in the "Brief" is meant seriously, but from articles we have seen in other medical journals and from conversation with some medical men there can be no question about it.

"Take the human seed germs (spermatozoa), put them upon a plate, first spreading some alkaline nourishment upon the plate; for instance a little soap, place the plate in a room of proper temperature, and in sixteen to twenty-four hours, swarms of *ants* will be running about. In other words, these living human germs placed under this different condition other than the mother soil, develop into ants. These little fellows can be watched and be seen to gradually develop and start off on the run. This would evidently appear that living germs, when placed by accident, or otherwise, under very different conditions, produce very different forms of life. But what relationship do we owe to the ant? Perhaps this is why the claim is made that the ant has more characteristics of the human being than any other animal."

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

MRS. A. T. SLOSSON has gone to Lake Toxaway, North Carolina, to spend a month.

UP-TO-DATE METHODS IN ENTOMOLOGICAL PUBLICATIONS.—Separates from the Journal of the New York Entomological Society for December, 1906 (which will be published seven months hence), have been distributed by the Government. These separates bear date of March 14, 1906, and were distributed April 17, 1906. This paper describes "The Larvæ of Culicidæ classified as Independent Organisms. By Harrison G. Dyar and Frederick Knab." This delicious admixture of the past and future dates is highly interesting. Species herein described conflict with those made known in the Canadian Entomologist and ENTOMOLOGICAL NEWS for April, 1906.* Of course the names in the NEWS and Canadian Entomologist would have precedence. It is not our intention to review this paper but only to refer to the dates and the fact that species are described from larvæ alone. In looking over it we have come to the conclusion that the future synonomy, etc., will be somewhat like a Chinese puzzle, and reminds us of the question, How old is Ann? We expect a paper shortly describing species from the egg or pupa alone.—HENRY SKINNER.

Omaha, April 29, 1906.

EDITORS NEWS: Gentlemen—Enclosed please find a paper which I wish printed in the May NEWS. Please send me proof. Yours truly, JOHN DOE.

San Francisco, Dec. 31, 1905.

EDITORS NEWS: Gentlemen.—I enclose a paper for the NEWS, which I wish to appear in the next number. Yours truly, JOHN GREEN.

New York, April 30, 1906.

EDITORS NEWS: I have just moved; please change my address and send May NEWS to 1908 Broadway. Yours truly, JOHN SWIFT.

Manayunk, April 30, 11.59 P. M.

EDITORS NEWS: Gentlemen.—Enclosed please find paper for the May NEWS. I know you have received fifty papers ahead of mine, but I want mine in the next number. If the NEWS is printed, kindly have a new edition struck off and insert my paper in it. Yours truly, JOHN GAUL.

(The above are only samples.—EDITORS).

"I HOLD it is not decent for a scientific gent
To call another one an ass—or words to that intent.
Nor should the individual who happens to be meant
Reply by heaving rocks at him to any great extent."
—"TRUTHFUL JAMES."

*_Culex sylvicola_ Grossbeck and _lativittatus_ Coq.

PROF. BERLESE'S APPARATUS FOR COLLECTING ARTHROPODS.—Prof. L. O. Howard's account of the Berlese apparatus for collecting small arthropods (ENT. NEWS, 1906, pp. 49-53), reminds me of a simpler method tried many years ago with great success by the late R. Lawson, of Scarborough, England. Instead of the metal funnel to be warmed by hot water, he used a similarly shaped suspended canvas bag, and drove the insects downward by placing rags saturated with ammonia above the material on the sieve. The result was the same, everything wanted falling into the tube of alcohol at the bottom.—G. C. CHAMPION, Horsell, Woking, England.

Doings of Societies.

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadephia was held Nov. 23, 1905, Mr. H. W. Wenzel, Vice-Director, presiding. Sixteen persons were present. The presentation of 3,167 specimens of Ichneumonoidea, including types, by Mr. G. C. Davis, was announced by the conservator. Dr. Calvert exhibited a map showing localities in Mexico from whence he had recently received Odonata. Every collection showed interesting material in either species new to Mexico and Central America or showing new distribution. *Nephepeltia phryne*, which has a curious spine on the metasternum, was exhibited from Guatemala. Dr. Skinner described dragon-fly collecting in the Huachuca Mts., So. Arizona. Mr. Rehn spoke of the Orthoptera he had recently received from Costa Rica and of a paper on the material. Two thousand specimens, 300 species, were under observation, of which 56 proved new. Mention was made of the various collections examined for the report. Mr. Daecke said he had found a nest of *Vespa carolina* at Riverton, New Jersey. He had taken both sexes and the workers and found *V. carolina* and *V. cuneata* to be the same species; the female queens were *carolina* and the males and workers *cuneata*. The nest was about twelve inches in diameter. The entrance was described as being papered and nicely built, the tunnel being nine inches long. Dr. Calvert spoke of the importance of a description of such a nest, as the subject was not well known. Mr. Wenzel said his son Harry had caught a lively male of *Vespa germanica* on January first. Mr. E. T. Cresson, Jr., was elected a member, and Mr. Oscar Mayer an associate.

HENRY SKINNER, *Recorder*.

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadelphia was held Dec. 28, 1905. Mr. Philip Laurent, Director, presiding. Twelve persons were present. Mr. Franklin, of Amherst, Mass., visitor. Mr. Matthews, exhibited several short-tailed specimens of *Papilio philenor* reared from chrysalids received from San Francisco, California. Mr. Franklin made some remarks on the nests of *Bombus*, having examined thirty. He found carbon bisulphide the best medium to quiet bees. In his opinion *Bombus pennsylvanicus* is the commonest species in the vicinity of Amherst, Mass., judging by the number of nests. Some remarks were also made on the possible correlation of sexes of some of the species. Mr. E. T. Cresson described methods used by himself in previous years in collecting specimens of this genus. Mr. Franklin remarked that the only specimens of the genus seen in early spring were queens. The following were elected to serve as officers for the year 1906: Director, Philip Laurent; Vice-Director, H. W. Wenzel; Treasurer, E. T. Cresson; Recorder, Henry Skinner; Secretary, Frank Haimbach; Conservator, Henry Skinner; Publ. Committee, C. W. Johnson, J. H. Ridings. J. A. G. REHN, *Recorder pro tem.*

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadelphia was held Jan. 25, 1906. Mr. H. W. Wenzel, Vice-Director, presiding. Fourteen persons were present. Mr. Bradley exhibited plates of Evaniidæ showing the various anatomical characters including neuration. Characters separating genera and species were shown and explained. Mr. Bradley also spoke of his last summer's trip to the Selkirk Mountains in British Columbia. Many insects of interest were taken although little of the material has as yet been studied. Some pictures of the scenery of the locality were shown. He said at 6,000 ft. altitude a Leptid was found which bit. Dr. Skinner exhibited some photos of dragon-fly wings and said they had been photographed against the light with a ground-glass background. This method showed the neuration in a satisfactory manner. It is a good method where the wings are to be enlarged and not removed from the body. Mr. Bradley said at Cornell University the wings were removed

and photographed, then the wings were kept separately and mounted on glass. Mr. Rehn exhibited a box of Orthoptera from Labuan, British North Borneo, a small island, to show diversity. He also made some remarks on the genus *Trimerotropis*. A large amount of material from the west had been studied. The color characters used by McNeill in his revision were not considered of very great importance for specific determination. The intergradational color patterns were illustrated by black-board sketches.

Dr. Calvert showed a series of tropical dragon-flies, *Erythrodiplax connata*, showing various color phases. Specimens with a red frons and others with a blue frons, described as different species, were shown by intergradations to be the same thing. Mr. Howard A. Snyder said, in October he had spent a few weeks in the Bermuda Islands but did not find any insects not found in the United States, probably on account of the nearness of the islands. The character of the climate and flora was mentioned and the insects taken exhibited. Dr. Calvert mentioned Verrill's work on the islands.

HENRY SKINNER, *Recorder*.

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadelphia was held March 22, 1906, Mr. Philip Laurent, Director, presiding. Ten persons were present, including Mr. W. M. Beutenmuller, of New York, visitor. The latter presented two hundred specimens of Coleoptera taken in the Black Mts., North Carolina. Mr. Beutenmuller spoke of the necessity of protecting valuable collections from fire, and gave a diagram of the plan for protecting the insect department of the American Museum of Natural History in New York. Mr. Rehn said he had recently determined some Tonkin Orthoptera for Mr. Chas. Schaeffer of the Brooklyn Institute. A fine walking-stick and four katydids were new.

HENRY SKINNER, *Recorder*.

A meeting of the American Entomological Society was held December 28, 1905, Dr. P. P. Calvert, President, in the chair. Twelve persons were present. The report of the Treasurer

was read, in which he stated there was a balance on hand of $1,262.97. Mr. E. T. Cresson, Jr., was elected a member. The following were elected officers to serve for the coming year: President, Philip P. Calvert; Vice-President, H. W. Wenzel; Treasurer, E. T. Cresson; Recording Secretary, Henry Skinner; Corres. Secty., Frank Haimbach; Curator, Henry Skinner; Librarian, E. T. Cresson, Jr. Publication Committee: E. T. Cresson, C. F. Seiss, B. H. Smith. Executive Committee: P. Laurent, H. W. Wenzel, Frank Haimbach. Finance Committee: J. W. McAllister, C. S. Welles, D. M. Castle. HENRY SKINNER, *Secretary*.

A meeting of the American Entomological Society was held Feb. 15, 1906, Mr. H. W. Wenzel, Vice-Director, presiding. Nine persons were present. The annual report of the Curator was read. Mr. Laurent said he had first used chip fruit baskets for shipping insects about fifteen years ago, and spoke of their value for this purpose. Since that time they had been used more or less by entomologists.

HENRY SKINNER, *Secretary*.

At the meeting of the Feldman Collecting Social, held February 26, 1906, at the residence of Mr. H. W. Wenzel, 1523 So. 13th St., Philadelphia. Eight persons were present. Mr. Carl Schaeffer, visitor. A letter from Dr. Dyar was read, in which he states that *Pamphila manataaqua* and *cernes* are congeneric. Mr. H. Wenzel read a very interesting note on *Omus* from a letter which he had received from Mr. Ralph Hopping, of Kaweah, Calif. The writer says "I take *O. intermedius* in one place only (Colony Road, Tulare Co., Calif.), 3,500 to 4,500 ft.; *O. sublaevis* in pine forest, 5,000 to 7,000 ft. The smooth form *O. laevis* occurs 8,000 to 10,000 ft. in my locality, but I have never had the luck to find it. Dr. Walther Horn's elevations for this form are incorrect. The collector unintentionally misinformed him. I went to a great deal of trouble to prove these elevations. The collector sent me a map marking the exact location, and from my intimate knowledge of the trails in the Sierras I was able to place the

exact locations." Mr. Huntington spoke about photography as it was applied by the Canadian Government in surveying the Rocky Mountains of Canada. Mr. Schaeffer spoke of the difficulty of collecting *Cicindela santaclaræ* on the plains at Palmerlee, Ariz. Mr. Schaffer exhibited some species of the genus *Anomala*, among them being four entirely new and four being new to North America; one species being from Lower California, two from Texas and others from Arizona.

F. HAIMBACH, *Secretary.*

A meeting of the Feldman Collecting Social was held March 21, '06, at the residence of Mr. Henry W. Wenzel, 1523 S. 13th St., Philadelphia, Mr. Erich Daecke, President, in the chair. Members present: Daecke, Wenzel, Laurent, A. Hoyer, Seiss, Harbeck, Castle and Skinner. Mr. Wm. Beutenmuller, New York, visitor. The minutes of the last meeting were read and approved. Mr. Wenzel said he had received a number of postals from our fellow-member, Prof. J. B. Smith, who is abroad. Mr. Beutenmuller said he had collected a number of Staphylinidæ during trips to the mountains of North Carolina in the last five years. Nine species of *Oxyporus* were taken. *Femoralis* and *major* were common. The other species found were *stygicus*, *vittatus*, *fasciatus*, *bicolor*, *lateralis*, *lepidus* *5-maculatus*. They were all taken in the fall execpt *stygicus*, which was found in May. Dr. Castle said he had found *O. major* plentiful at Angora, Pa., in the fall. On March 10th, Mr. Harbeck said he took five species of diptera, seventeen specimens, at Germantown, Phila., including *Fucellia fucorum*, which only appeared while the sun was shining. Mr. Wenzel exhibited a pair of *Strataegus splendens* from Tybee Island, Ga., taken by H. A. Wenzel. Mr. Daecke reported having been out collecting on March 11th, and took a dipterous larva feeding on spider eggs and some other hibernating imagos and larvæ. In a small spot protected from the cold, he took some insects on wild honeysuckle. In a box of farina he found an imago and many larvæ of *Ephestia kuehniella*.

Dr. Skinner invited the Social to meet at his home at the next meeting (April). HENRY SKINNER, *Recorder pro tem.*

EXCHANGES.

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☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Wanted.—Records of Ontario insects, for compilation of list. Please give authentic data and indicate source of identifications. Lists of smaller orders and Neuropteroids wanted at once.—Franklin Sherman, Jr., Dept. Ent. Ont. Agr. Col., Guelph, Canada.

Lepidoptera: Exchange for specimens new to my collection. Exotics also accepted.—A. Troschel, 853 Irving Park Boulevard, Chicago, Illinois.

Lepidoptera.—Liberal exchange given for desirable North American Heterocera.—Henry Engel, Box 35 Oak Station P. O., Allegheny Co., Pa.

European Lepidoptera in exchange for pupæ of native moths, especially *S. cynthia*.—Miss Kate W. Strong, Setauket, Long Island, N.Y.

Wanted.—*Lycænas*, *Theclas*, *Chionobas* and *Anthocharis*, either for cash or exchange. Send list to H. H. Brehme, 44 Mercer street, Newark, N. J.

Papilios of the world desired. What do you wish in exchange?—C. F. Groth, 141 East 40th street, New York City.

Wanted, for cash or exchange, Bulletins U. S. Bureau of Entomology. Old series 1-5, 7-15, 18, 20, 21, 26, 27, 30, 33. New series 8, 39, Technical series, 1, 3, 5, 6, 7. Bib. Econ. Ent., parts 4, 5, 6.—Albert V. Taylor, Bedford, Ohio.

Wanted.—Bibionidæ of North America for which I will pay cash, also ENTOMOLOGICAL NEWS, Vol. XV, No. 9—W. A. Hooker, Bureau of Entomology, Washington, D. C.

Exchanges solicited from all sections of the country. Have hundreds of duplicates. Moths or butterflies. Send lists to Joseph H. Reading, 775 N. Rockwell St., Chicago, Ill.

Cicindelidae.—*C. celeripes* and other Nebraska and Iowa species to exchange for Cicindelidæ.—Frank H. Shoemaker, 2960 Dewey Ave., Omaha, Neb.

Wanted.—LeConte's "Revision of the Elateridæ;" also North American species of *Corymbites* and other Elateridæ and Buprestidæ.—C. O. Houghton, Del. Col. Agric. Expt. Sta., Newark, Delaware.

Wanted.—Vol. III, No. 1 "Papilio" and Vols. VIII and IX, Jour. N. Y. Ent. Soc., also Danaidæ of the world.—C. V. Blackburn, 101 Pine St., Woburn, Mass. (See Label adv.)

Tenodera sinensis.—Without doubt *Tenodera sinensis* is one of the most curious and interesting insects found in the United States of North America I have egg masses of fertile eggs, as well as mounted specimens of the perfect insect to exchange. Regarding *Tenodera sinensis*, see ENT. NEWS, Vol. IX (1898) p. 144.—Philip Laurent, 31 East Mt. Airy Ave., Philadelphia, Pa.

Wanted.—North American Philanthidæ for study. Will determine fossorial Hymenoptera for the privilege of retaining desirable material.—J. C. Bridwell, Insectary M. A. C., Amherst, Mass.

Wanted.—Orchids plants or roots of them for cash or in exchange for brilliant exotic Lepidoptera, such as *Ornithoptera Urania crœsus*, *riphæus*, *morpho* and rare native species.—Chas. F. Timm, 170 Bleeker St., Brooklyn, N. Y.

Wanted.—Microlepidiptera, especially *Tineina* of North America. Will give named material in return; also Microlepidoptera and Coleoptera. Will buy desirable material.—Dr. W. G. Dietz, Hazleton, Pa.

Before the season opens, I wish to arrange with parties in the southern United States and Mexico for the collecting of Ruprestidae and *Phanæus*. Good exchange given.—E. A. Klages, Crafton, Pa.

Coleoptera.—I wish to buy one or more original collectings of beetles from either North, South or Central America.—Fred. C. Bowditch, 164 Rawson Road, Brookline, Norfolk Co., Mass.

Wanted for Cash.—Transactions of the American Entomological Society, Vol. III (3). Will pay a fair price for a copy in good condition. W. C. Wood, 51 Fifth Avenue, New York.

Samia cynthia Cocoons to exchange for live pupæ and cocoons of *Hyperchiria io, Telea polyphemus, Triptogon modesta, Philimpelus achemon* or *P. pandorus*.—John H. Matthews, 3219 N. Thirteenth Street, Philadelphia, Pa.

Wanted eggs of *Anosia archippus*, living preferred, for the purpose of making photographs for J. W. Tutt's British Butterflies.—A. E. Tonge, Reigate, Surrey, England.

Wanted.—*Cicindela trilunaris, C. campestris*, and *Omus*, matured insects. Also pupae, larvae and eggs of North America *Cicindela*.—F. H. Goodfellow, Room 611, 42 Broadway, New York City.

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Lycæna exilis wanted in exchange for foreign Lepidoptera, or for cash. Will take a large number.—Denton Bros., Wellesley, Mass.

Wanted.—A number of Experiment Station Records to complete my file. Have considerable number of duplicates to offer in exchange. Send for list.—Wilmon Newell, Baton Rouge, La.

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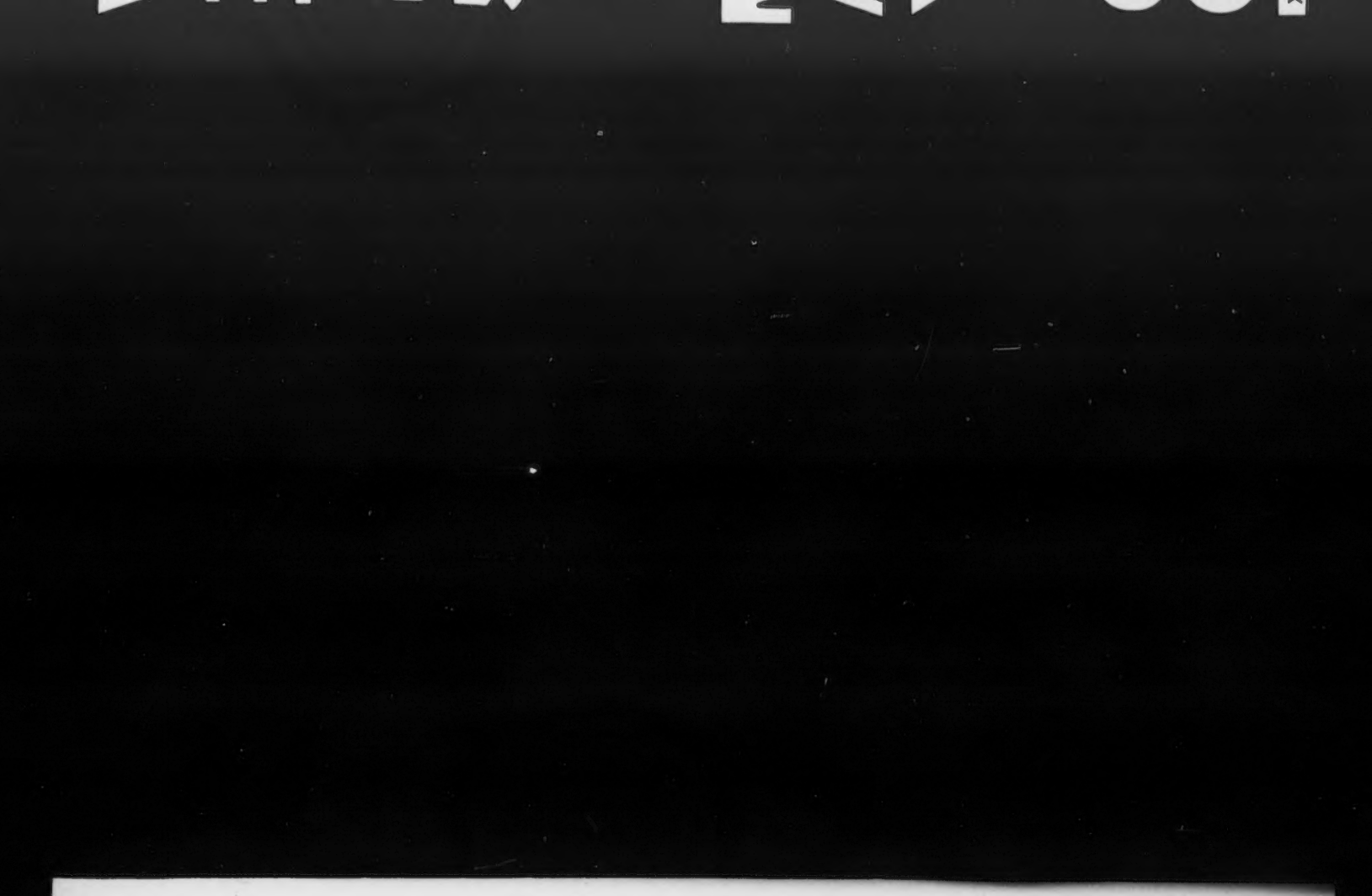

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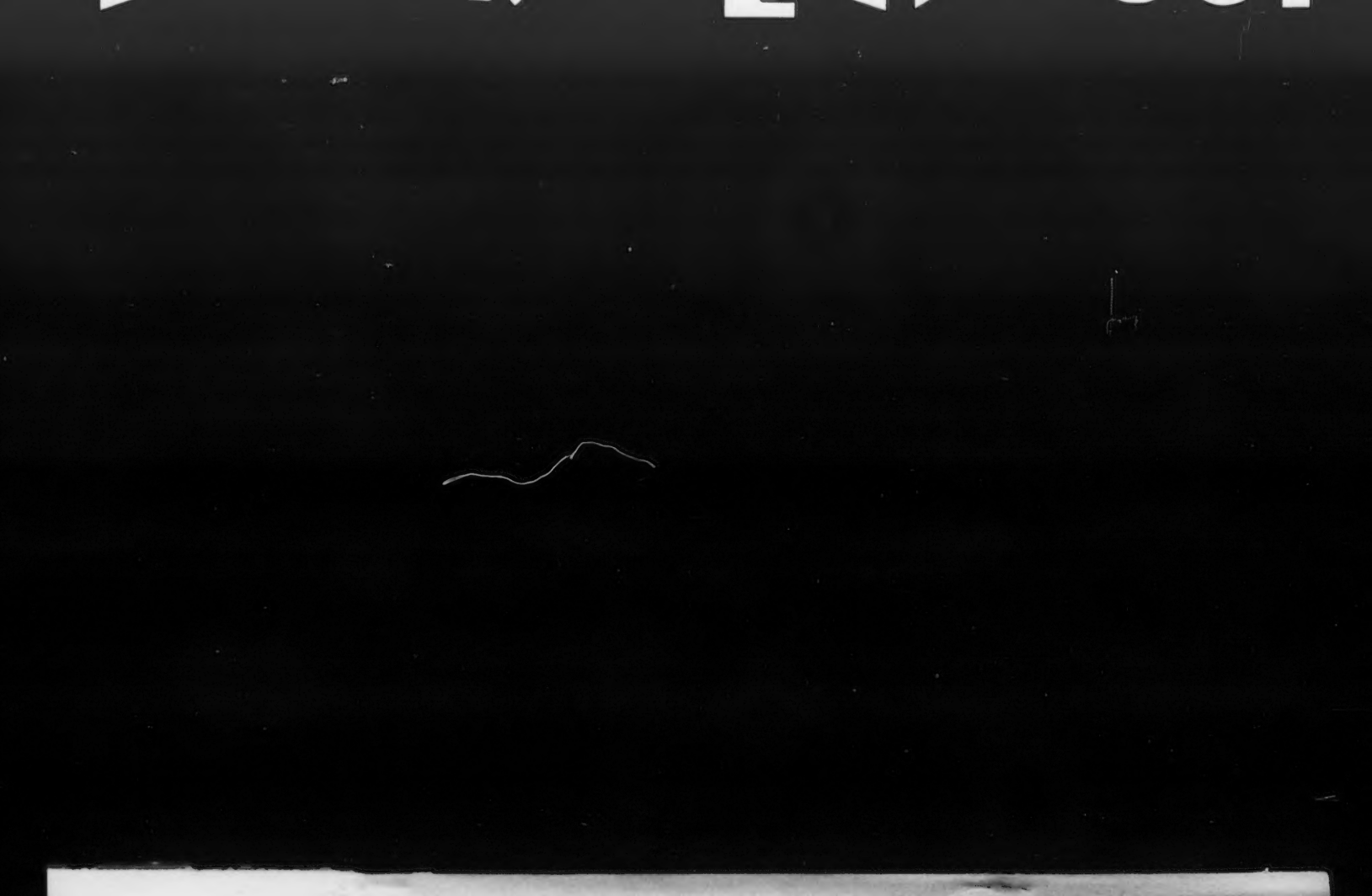
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